AD-A149 483 FOLLY RIVER NAVIGATION STUDY CHARLESTON COUNTY SOUTH CAROLINA DETAILED PROJECT REPORT(U) CORPS OF ENGINEERS CHARLESTON SC CHARLESTON DISTRICT DEC 77 1/1

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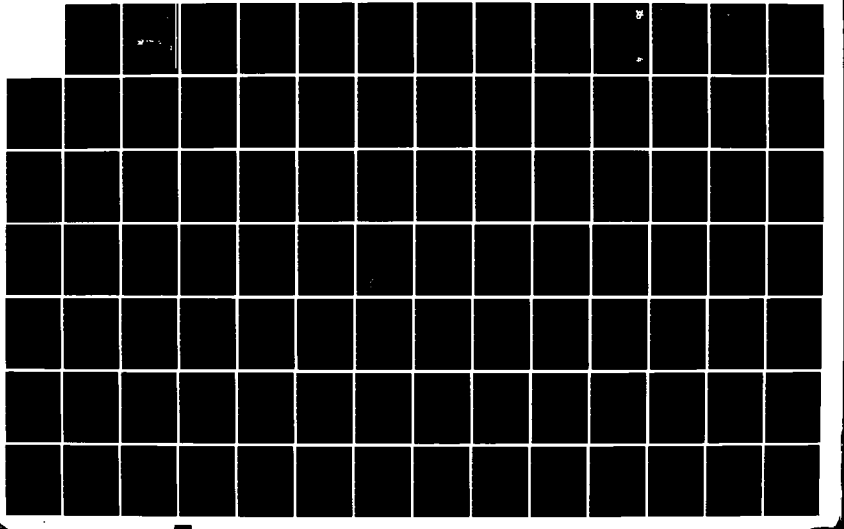
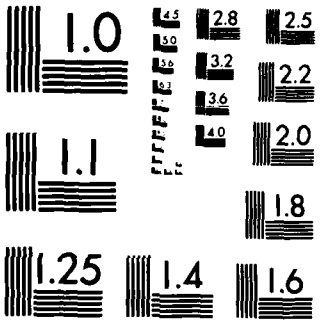
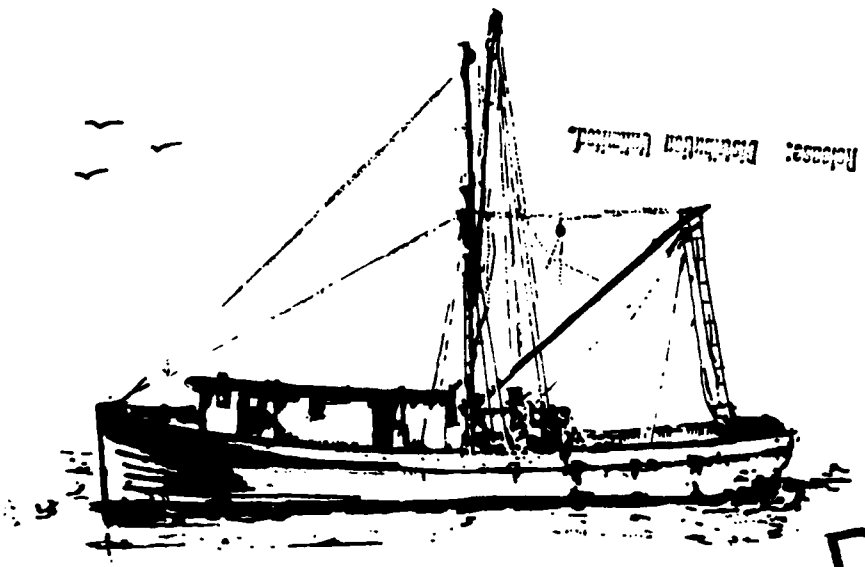




FOLLY RIVER

CHARLESTON COUNTY, S. C.

NAVIGATION STUDY



DETAILED PROJECT REPORT

PREPARED BY THE
CHARLESTON DISTRICT, CORPS OF ENGINEERS
DEPARTMENT OF THE ARMY

SUBMITTED:

DECEMBER 1977

SADPD-P (23 Dec 77) 1st Ind
SUBJECT: Folly River Navigation Study, Charleston County, South Carolina - Submission of Detailed Project Report

DA, South Atlantic Division, Corps of Engineers, 510 Title Building, 30 Pryor Street, S.W., Atlanta, Georgia 30303 1 March 1978

TO: HQDA (DAEN-CWP-E), WASH DC 20314

1. The subject report is furnished in accordance with instructions contained in ER 1105-2-50. The report recommends construction of a small craft navigation project in Folly River, Folly Creek and Stono Inlet, and recreational facilities to provide a beach access/biological observation park on the southern tip of Folly Island. Placement of the dredged material would be at the proposed park.

2. Subsequent to receipt of the report in this office, locals have indicated their interest in placement of the dredged material on the beach near the center of the island where a serious erosion problem exists. This can be accomplished in accordance with Section 145 of the 1976 WRDA at the time of construction if locals will pay the added cost of pumping to the alternate disposal area. Officials of the town of Folly Beach have indicated a willingness to pay additional costs for placing material on the beach.

3. Without placement of the dredged material at the proposed park, development of the recreation park is doubtful. Additionally, the District advises that a private developer has taken an option for residential development on land where the park is proposed. Thus, this land may not be available for the proposed park. Therefore, we recommend approval upon receipt of favorable state indorsement and issuance of a Section 404 public notice of the navigation project without the recreation feature. We anticipate state indorsement shortly and the District is in the process of issuing the Section 404 public notice.

4. Preconstruction planning funds are on hand in the District. By copy of this indorsement, Charleston District is advised to proceed with plans and specifications and address the attached comments during preconstruction planning.

CF: DE, Charleston, ATTN: SACEN-PS

SADPD-P (23 Dec 77) 1st Ind 1 March 1978
SUBJECT: Folly River Navigation Study, Charleston County, South Carolina - Submission of Detailed Project Report

5. It is anticipated that a construction contract can be awarded in late August or early September 1978.

2 Incl
wd 5 cys Incl 1
Added 1 Incl
2. SAD Comments

MARVIN W. REES
Colonel, Corps of Engineers
Acting Division Engineer

CF:
DE, Charleston, ATTN: SACEN-PS

SAD Comments
On
Folly River, Charleston County, South Carolina
Section 107 Detailed Project Report

1. Appendix 2, page 22, paragraph 36. A magnemometer survey of the entire channel would be desirable if documentary research reveals a strong probability that sunken or abandoned ships or boats of some angiquity may be present. The South Carolina Department of Archives and History letter of 16 March 1977 in Appendix 3 indicates a definite possibility of 18th and 19th Century shipwrecks in the project limits.

2. Appendix 2, page 22, paragraph 37. A documentary search, as well as a field reconnaissance, should be performed for all beach and terrestrial disposal areas prior to the beginning of dredging to insure that no cultural resources exist which may force alteration of the project during the construction period. Such studies are required by Corps cultural resources regulations. A documentary search, by itself, will often prove meaningless for the reason that no archeological or historic inventories of an area have yet been conducted.

State of South Carolina
Water Resources Commission

Clair P. Guess, Jr.
Executive Director

February 24, 1978

Colonel William W. Brown
Department of the Army
Charleston District, Corps of Engineers
Post Office Box 919
Charleston, South Carolina 29402

Dear Colonel Brown:

The staff of the South Carolina Water Resources Commission has received and reviewed the detailed project report on Folly River, "Navigation Study" December, 1977. We find the proposed improvements are generally acceptable for this project. However, there are several comments which should be expressed.

The Water Resources Commission shares the viewpoint of the South Carolina Coastal Council that the beach nourishment project, especially if the county fails to participate in the park, may be utilized to replenish some of the highly eroded beach areas.

Other state responses are included as enclosures - South Carolina Wildlife and Marine Resources Department, South Carolina Coastal Coastal Council, and South Carolina Department of Parks, Recreation and Tourism. It is our understanding that the S.C. Department of Health and Environmental Control separately forwarded comments on the project.

The S.C. Water Resources Commission appreciates the opportunity to comment on this important project.

Sincerely,

Clair P. Guess, Jr.
Executive Director

CPGJ:rhv
Enclosures
gjm

P. O. Box 4515 / 3830 Forest Drive / Columbia, S. C. 29240 / (803) 758-2514

February 16, 1978

Christopher L. Brooks
Planner/Economist
S. C. Water Resources Commission
P. O. Box 4515
Columbia, South Carolina 29240

Dear Mr. Brooks:

Personnel from the South Carolina Coastal Council have reviewed the project report from the U. S. Army Corps of Engineers on the Folly River Navigation Feasibility Study and submit the following comments.

The beach nourishment project is a very viable alternative for spoil removal. However, based on a recent referendum held by the City of Folly Beach, the county park (Beach-Walker Park) referred to as the benefactor for beach nourishment is not a certainty. If the county fails to obtain this land for a park, we would suggest that nourishment of the north and central sections of Folly Beach be studied, as these sections presently show the highest erosion and are in the most immediate danger.

Sincerely,

H. Wayne Beam DCW

H. Wayne Beam
Executive Director

HWB:lsb

SOUTH CAROLINA COASTAL COUNCIL

South Carolina
Wildlife & Marine
Resources Department

James A. Timmerman, Jr., Ph.D.
Executive Director

February 13, 1978

Mr. Clair P. Guess, Jr.
Executive Director
S. C. Water Resources Commission
P. O. Box 4515
Columbia, S. C. 29240

Re: Detailed Project Report of the Folly River Navigation Study; Stono Inlet and Folly Creek; Charleston County

Dear Mr. Guess:

Personnel from the Wildlife and Marine Resources Department have reviewed the above project report on the Folly River Navigation Study and have evaluated its effects on fisheries habitat, water quality, recreation and other factors related to the conservation of wildlife and fisheries resources. We are pleased to submit the following comments.

Folly River, Stono Inlet, and the adjacent estuaries are productive estuarine areas as evidenced by the presence of three (3) designated state and public oyster grounds (refer to attached map) and numerous other highly productive shellfishing areas. All dredging in the area should be conducted so as to reduce the frequency of dredging and minimize the impact to the marine habitats and faunal communities thereof. Consequently, we recommend that the selected dredged channel route follow the existing natural channel from Highway 171 bridge to the ocean. In addition, the dredging should be conducted during the period of lowest biological activity, i.e., from mid-December to mid-February, and should be conducted during the ebb tide whenever possible.

With respect to selection of the spoil disposal area, we recommend that the beach disposal area be utilized rather than the deep water disposal area between Bird Key and Sandy Point. This would reduce the possibility of dredged materials re-entering the channel and producing adverse conditions in adjacent estuaries due to increased turbidity and siltation. We have no objection to the open water disposal of spoil removed from shallow areas offshore.

All dredging and associated activities should be conducted so as to avoid any disturbance to Bird Key. The 300 to 700 pairs of colonially nesting shorebirds that utilize this small island for breeding are extremely vulnerable to human

[illegible] 29202 Telephone: 803 758 6536

disturbances, which generally result in reduced habitat acceptability, changes in breeding habits, and a general decrease in productivity. The integrity of Bird Key could best be maintained by following the recommendations outlined above.

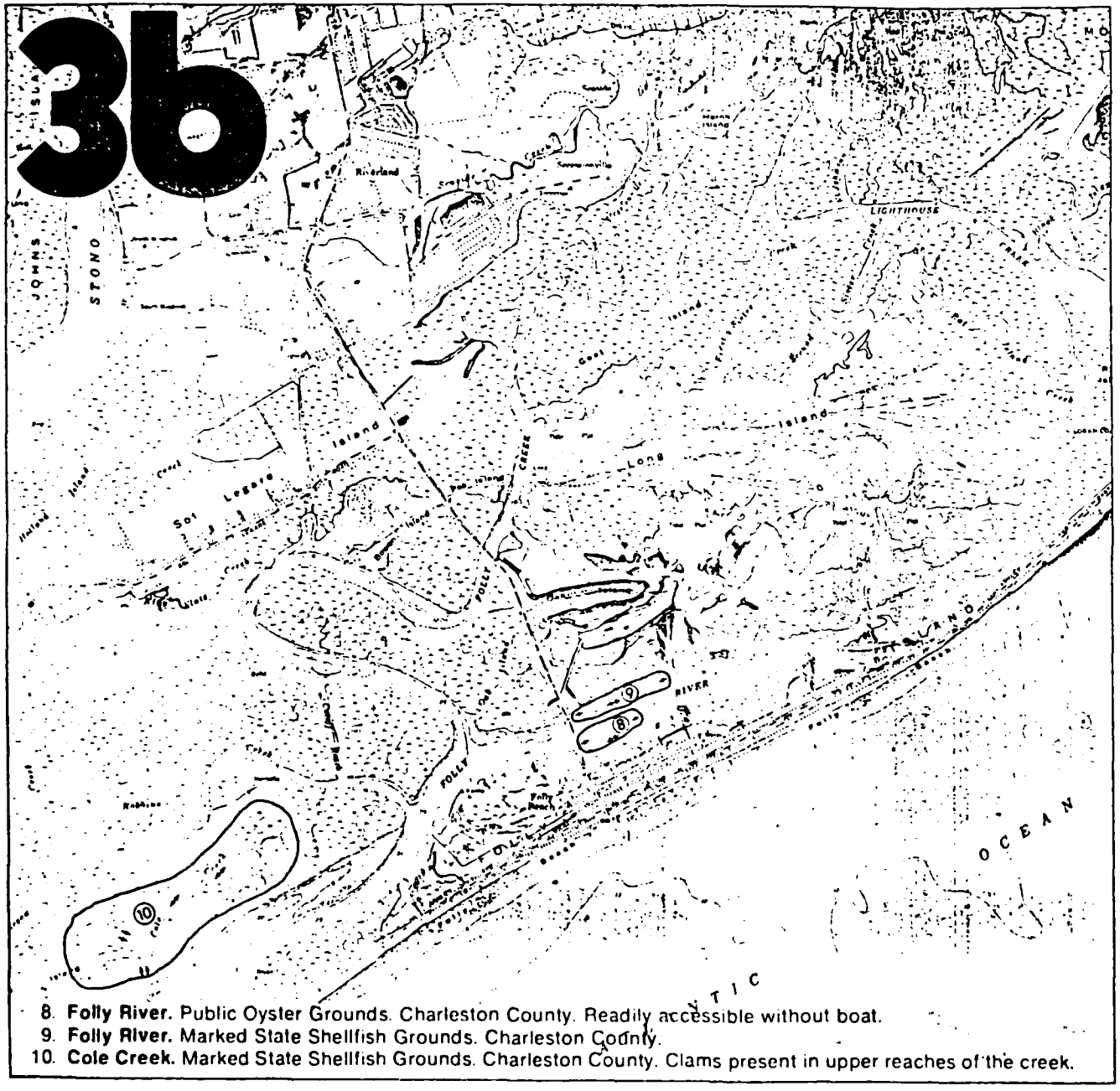
The recreation/preservation option, as outlined in the project report, is an attractive feature of the total proposed plan. This would be an aesthetic and environmental plus on a long-term basis, and would provide the area with improved public beach access.

In conclusion, we recommend that the selected plan (Plan A-2 + R) be implemented and conducted following the above recommendations so as to minimize adverse environmental impact and maintain the high quality of the area's marine resources.

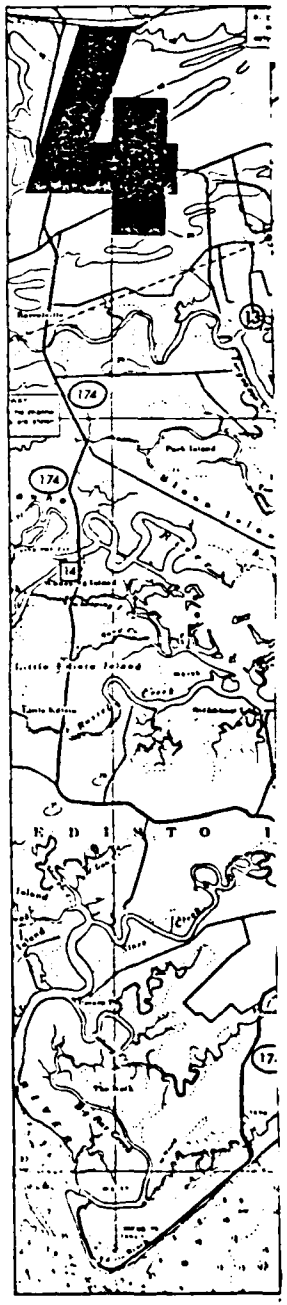
Sincerely,

James A. Timmerman, Jr.
Executive Director

JATjr/sa
attachment
cc: Bearden



8. **Folly River.** Public Oyster Grounds. Charleston County. Readily accessible without boat.
9. **Folly River.** Marked State Shellfish Grounds. Charleston County.
10. **Cole Creek.** Marked State Shellfish Grounds. Charleston County. Clams present in upper reaches of the creek.



PRT

February 7, 1978

Mr. Chris Brooks, Planner/Economist
South Carolina Water Resources Commission
3830 Forest Drive
Post Office Box 4515
Columbia, South Carolina 29240

Dear Chris:

With reference to the Corps of Engineers' Folly River Navigation Study, we see no objections to the recreation option set forth in the study. The State Comprehensive Outdoor Recreation Plan and the Public Beach Access Study acknowledge the need for increased public access to South Carolina beaches, especially around urban areas such as Charleston. As stated in the Beach Access Study, however, new roads and the resulting additional traffic should not conflict with the scenic quality of the beaches, the visual form of dune ridgelines or destroy vegetation. Visual access to beaches and the oceans should be considered an essential part of the State's tourism and recreational appeal.

I hope these comments will suffice for study review purposes.

Sincerely,

Beth

Beth McClure, Assistant Director
Division of Planning

BMcC:pd

cc: Mr. William R. Jennings

South Carolina Department of Parks, Recreation & Tourism
Suite 113, Edgar A. Brown Building • 1205 Pendleton Street • Columbia, South Carolina 29201

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

Albert G. Randall, M.D., M.P.H.
Commissioner

Sims-Aycock Buildings
2600 Bull Street, Columbia, SC 29201

February 15, 1978

Col. Harry S. Wilson, Jr., District Engineer
U.S. Army, Corps of Engineers, Charleston District
P.O. Box 919, Federal Building
Charleston, South Carolina 29402

Dear Col. Wilson:

This office has reviewed the Project Report for the Folly [illegible] Navigation Project and the Shellfish and Recreational Waters Division of this agency has made the following suggestions:

(a) Dredging in Folly River and Folly Creek should be limited to the closed shellfishing season.

(b) The Shellfish and Recreational Waters Division of the S.C. Department of Health and Environmental Control should be notified prior to any dredging activities in Folly River and Folly Creek.

We appreciate this opportunity to comment on this project and if we can be of any assistance, please contact us.

Sincerely,

Charles R. Jeter, P.E.
Chief, Bureau of Wastewater and
Stream Quality Control

CRJ:JME:bg

cc: C. Barry Shedrow
J. Luke Hause

FOLLY RIVER NAVIGATION STUDY

CHARLESTON COUNTY, SOUTH CAROLINA

A study to determine the feasibility of providing a shallow draft navigation channel and related water resource improvements in the vicinity of Folly River, South Carolina.

CHARLESTON DISTRICT, CORPS OF ENGINEERS
DEPARTMENT OF THE ARMY

DECEMBER 1977

FOLLY RIVER NAVIGATION STUDY
CHARLESTON COUNTY, SOUTH CAROLINA

DETAILED PROJECT REPORT

PERTINENT DATA
(December 1976 price levels)

First Cost[1/]	6 3/8%	6 5/8%
NAVIGATION PROJECT		
Total	$265,000	$265,000
Federal	265,000	265,000
Non-Federal	0	0
RECREATION PROJECT		
Total	$675,000	$675,000
Federal[2/]	337,500	337,500
Non-Federal	337,500	337,500
Economic Justification		
NAVIGATION PROJECT		
Total Average Annual Benefits	$148,200	$148,200
Return on Increased Catch	138,400	138,400
Vessel Damage Reduction	9,800	9,800
Total Average Annual Cost	84,700	85,800
Capital Cost	17,700	18,300
Maintenance Dredging	66,000	66,500
Maintenance of Navigational Aids	1,000	1,000
Benefits to Cost Ratio	1.7	1.7
RECREATION PROJECT		
Total Recreational Benefits	$303,500	$302,700
Average Annual Cost	52,200	53,600
Capital Cost	45,200	46,600
Maintenance of Facilities	7,000	7,000
Benefits to Cost Ratio	5.8	5.6

1/ Pre-authorization study cost not included.

2/ Figures shown assume that the Federal Bureau of Outdoor Recreation will pay one-half of land cost associated with the development of a beach access/biological observation park.

Syllabus

This report presents the engineering, economic and environmental studies conducted to determine the advisability of providing shallow draft navigation channels at Folly River and Stono Inlet. The study was conducted in response to a request by the City of Folly Beach and Charleston County Council.

Folly River and Stono Inlet provide access to the ocean for the commercial shrimping fleet which is harbored in the estuary behind Folly Island. Shoals which have developed in Folly River and Stono Inlet are endangering navigation there and restricting the hours of operation of the commercial fleet; thereby reducing the catch of local fishermen. An unobstructed channel to the ocean is desired by local interests.

The best plan to improve navigation to the area would be to provide a channel 80 feet wide and 9 feet deep in Folly River and an entrance channel at Stono Inlet 100 feet wide and 11 feet deep. The estimated first cost of these channel improvements is $265,000. The average annual cost of these improvements including periodic maintenance dredging would be $84,700 Total average annual benefits attributable to navigation improvements are estimated at $148,200.

Adverse environmental effects due to increased turbidity should be localized and transitory. Use of sandy material dredged from shoals in Folly River for nourishment of the beach at the western end of Folly Island should reduce erosion there.

Federal assistance to Charleston County Park, Recreation and Tourist Commission in the development of a beach access park on the western tip of Folly Island is also recommended as part of the proposed plan. The estimated first cost of providing the park facilities (exclusive of lands) is $175,000 which would be apportioned on a 50/50 cost basis between Federal and non-Federal interests. Average annual costs to purchase lands, develop and maintain the beach access park would be $52,200. Total average annual recreational benefits are estimated at $303,000.

FOLLY RIVER NAVIGATION STUDY
CHARLESTON COUNTY, SOUTH CAROLINA

DETAILED PROJECT REPORT

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FOLLY RIVER NAVIGATION STUDY
CHARLESTON COUNTY, SOUTH CAROLINA
DETAILED PROJECT REPORT

THE STUDY AND REPORT

Vast marine resources are a significant part of South Carolina's natural heritage. Harvesting, processing, preparing, serving and consuming the great variety of seafood found in the coastal environment has been a traditional source of income, employment and recreation for residents of the Carolina Low Country since colonial times. To fully realize the economic and recreational potential of our marine resources, reliable facilities and conveyances are needed to get these resources from the ocean to the market place.

PURPOSE AND AUTHORITY

At the request of local interests, the Chief of Engineers has authorized this small navigation study. The authority for this study is contained in Section 107 of the 1960 River and Harbor Act as amended, which allows the Chief of Engineers in certain cases to conduct studies which are not individually authorized by Congress. The purpose of this investigation was: First, to determine the need for and advisability of providing and maintaining a shallow draft navigation channel from upstream docking areas on Folly River and Folly Creek through Stono River Inlet and bar to the Atlantic Ocean off Charleston County. Second, to determine what, if any, other water and related land resource needs exist in the area. Third, to determine what management measures could be taken to address those needs.

SCOPE OF THE STUDY

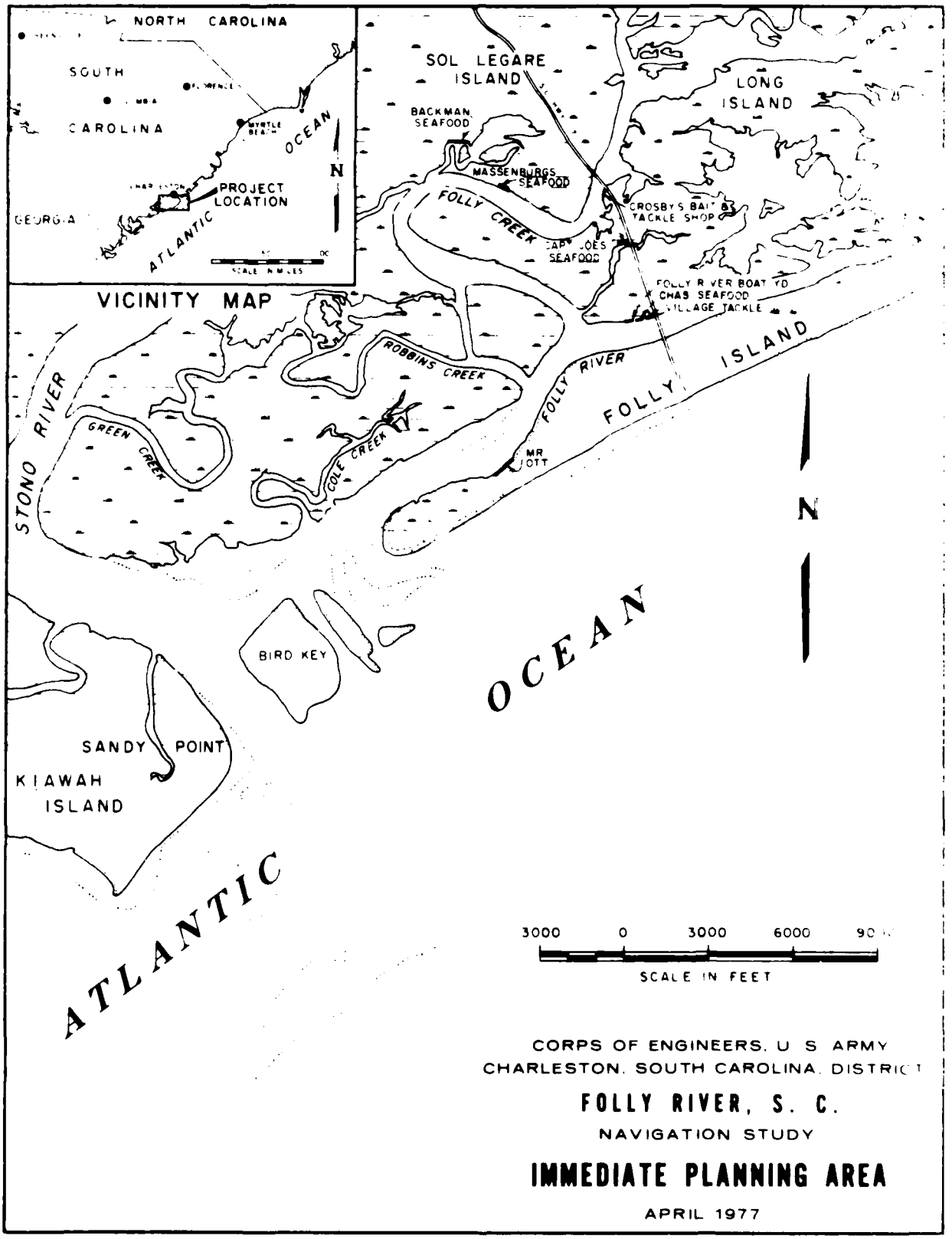
The studies in this report focus on the water and related land resource needs in the vicinity of Folly Island, South Carolina. This study also examines these local needs and tentative solutions in light of the needs of the surrounding Charleston County.

Because the boundaries of the immediate planning area are different from the political boundaries in the vicinity, figures and analysis will be given for several inclusive areas. The geographical locations and boundaries of these areas are shown in Figures 1 and 2.

The immediate planning area will focus on the water courses and adjacent highground areas behind Folly Island, west of Highway 171 and south of Sol Legare Road. This will include Sol Legare Island, Bowens Island, western Folly Island and Bird Key. The water courses of primary concern are Folly River, Folly Creek and the Stono River.

The Town of Folly Beach, which has most of the developable land in the immediate planning area, will be used to represent the immediate planning area demographically. James Island District, which includes James Island, Sol Legare Island and Folly Island, is the next largest demographic area which will be covered. Charleston County will represent the general study area. Projections for economic growth and population trends are given for The Tri-County Planning Area which includes Berkeley, Charleston and Dorchester Counties; this planning area is also congruent with the Charleston Standard Metropolitan Statistical Area.

Investigations were made to determine: the immediate and future need for navigational improvements in the immediate planning area, the



CORPS OF ENGINEERS, U S ARMY
CHARLESTON, SOUTH CAROLINA, DISTRICT

FOLLY RIVER, S. C.

NAVIGATION STUDY

IMMEDIATE PLANNING AREA

APRIL 1977

FIGURE 1

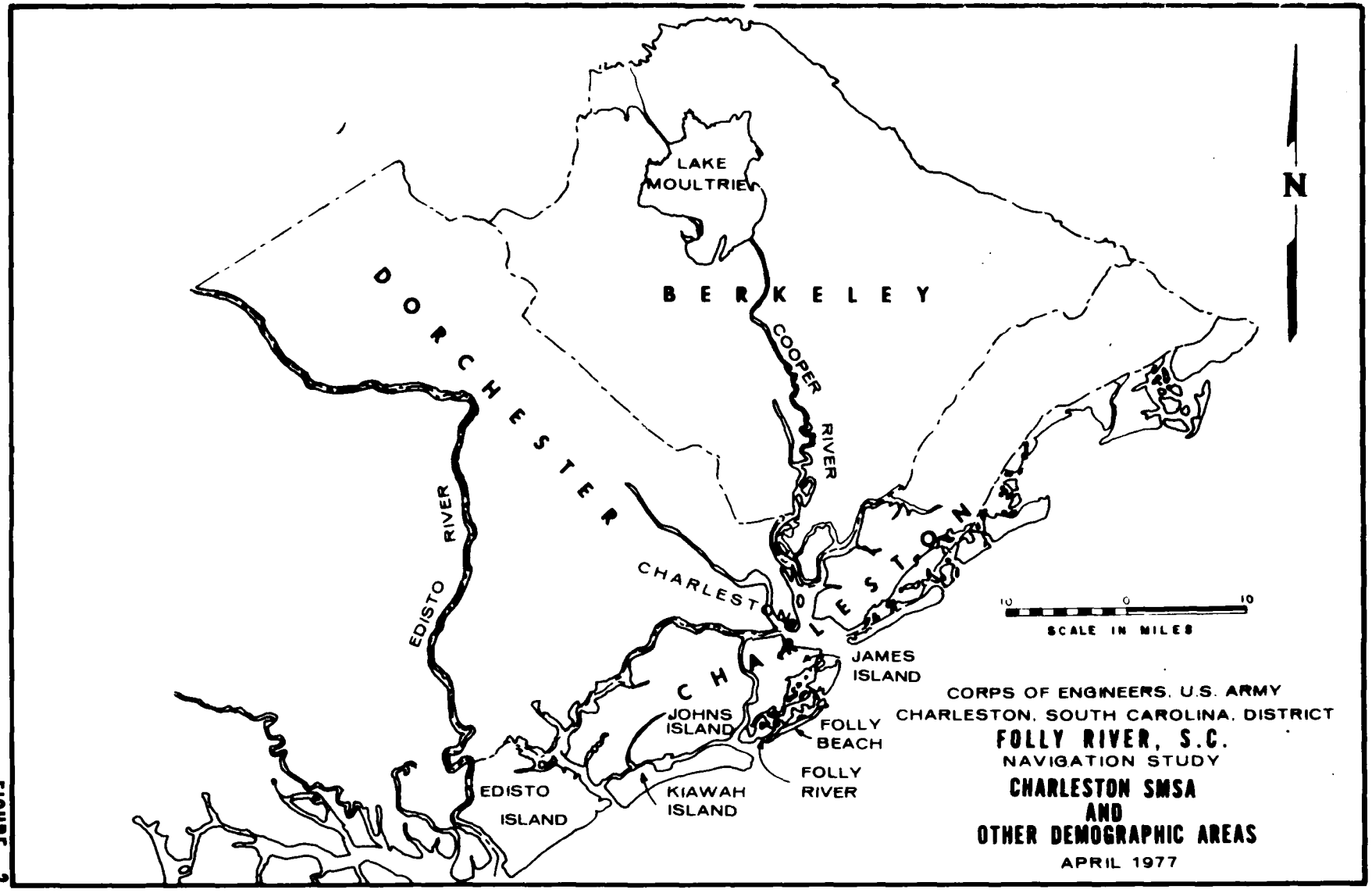

LAKE MOULTRIE
BERKELEY
DORCHESTER
COOPER RIVER
EDISTO RIVER
CHARLESTON
N
10 0 10
SCALE IN MILES
JAMES ISLAND
JOHNS ISLAND
FOLLY BEACH
FOLLY RIVER
KIAWAH ISLAND
EDISTO ISLAND
CORPS OF ENGINEERS, U.S. ARMY
CHARLESTON, SOUTH CAROLINA, DISTRICT
FOLLY RIVER, S.C.
NAVIGATION STUDY
CHARLESTON SMSA
AND
OTHER DEMOGRAPHIC AREAS
APRIL 1977

FIGURE 2

affected public's conceptions of the problem and their desires for a solution. In addition, various individual measures or combinations thereof which could be taken to alleviate these difficulties were studied; as were the social, environmental and economic consequences of several possible alternative actions.

All studies were made in sufficient depth and detail to permit formulation of an economically feasible, environmentally compatible and socially acceptable plan. Several plans which could fulfill planning objectives were considered; concurrently their effects in various areas of concern were analyzed and displayed in a system of accounts so that a circumspect decision could be made as to which plan would result in the most desirable outcome.

STUDY PARTICIPANTS AND COORDINATION

In order for any responsible agency to assist in developing a solution to a communities' problem, the nature of the difficulty must first be clearly understood. Further, to implement a solution, it must be acceptable to a variety of concerns, for example, the people who will be affected, their official and unofficial representatives and other governmental agencies concerned with the various impacts of the project. To insure that each area of concern in this study is adequately addressed, an interdisciplinary approach has been followed. The appropriate local, state and federal agencies were consulted, along with numerous local citizens as to their ideas on each of the four planning tasks, including: problem identification, formulation of alternatives, impact assessment and plan evaluation. Problem identification was supplied by local interests,

as were some aspects of project formulation and impact evaluation. This was accomplished through continuous informal contacts, and two public meetings. Biologists from the U. S. Fish and Wildlife Service provided assistance in impact assessment and formulation of dredging and disposal alternatives as did the South Carolina Wildlife and Marine Resources Department. In addition, the SCW&MRD fisheries statistics and commercial fishing sections provided valuable assistance in analyzing effects of the project on the local shrimping industry. Members of Charleston County Park, Recreation and Tourist Commission (PRT) provided information on the need for recreational facilities in the area. The U. S. Coast Guard advised on aids to navigation and recreational boating safety. The Corps of Engineers provided engineering feasibility, economic and institutional analysis, in addition to planning, coordinating and synthesizing the efforts of others to produce a report and propose corrective action.

THE REPORT

Results of this study have been arranged into a main report and four appendixes. The main report is a brief non-technical presentation, with recommendations, concerning the need for and advisability of providing and maintaining a shallow draft navigation channel in the immediate planning area. Appendix One is a more detailed technical report following the same general outline as the main report. Appendix Two contains an environmental assessment of the planning area and the effects various alternative actions would have on the local environment. Appendix Three includes the comments and views of those agencies and persons who expressed an interest in the project. Appendix Four is a reference list for Section 404 evaluation which involves the disposal of dredged material in navigable or ocean waters.

PRIOR STUDIES AND REPORTS

Within Charleston County, there have been two similar studies conducted under the Section 107 authority, both resulting in construction of small navigation projects. These are: Town Creek at McClellanville, South Carolina and Adams Creek at Rockville, South Carolina. In addition, Shem Creek, which serves shrimpers and head boats located in Mount Pleasant, South Carolina, is maintained to a depth of minus ten feet MLW as part of the Charleston Harbor project. However, no prior navigation studies have been made within the immediate planning area around Folly River.

RESOURCES AND ECONOMY OF THE STUDY AREA

Due to a variety of natural resources, Charleston County has a well diversified, although somewhat underdeveloped, economy. The principal economic activities of the area can be related to the availability of several natural resources. A temperate climate, along with favorable topography and soil conditions are conducive to both agriculture and silviculture, which are engaged heavily in the county and account for the greatest land use. A coastal location with several navigable rivers makes Charleston a favorable place for import/export shipping and related port and terminal activities. The South Carolina Ports Authority is presently planning further port facilities with a view to improving the economic development of the county and the state.

Also, attributable to the geographical and geological situation of

Charleston County are several military and government installations, including Air Force and Navy Bases, which employ a large sector (approximately 1/3) of the work force in the area. The coastal location also affords opportunities for area residents in several fisheries, both commercial and recreational, including shrimping, finfishing, oystering, clamming and crabbing. The historical background and fine architecture of Charleston, in addition to the beauty and aesthetic appeal of the "Low Country's" beaches, marshes and rivers, combine to make Charleston extremely popular with tourists from the entire eastern seaboard. Tourism, recreation and associated services provide 12,000 jobs and 45 million dollars per year in personal income to residents of the Charleston area. In fact, tourism-related employment is second only to Government employment within the county. In the immediate vicinity of Folly Island, recreation, tourism and fisheries are of primary importance, both in terms of income and local employment.

ENVIRONMENTAL SETTING AND NATURAL RESOURCES OF THE STUDY AREA

Charleston County is at the center of what is known locally as the Carolina Low Country. The name fits; elevations are typically less than twenty feet above mean sea level and relief is extremely limited. The study area lies on the lower coastal plain bordering the Atlantic Ocean and was once a submerged portion of the Continental Shelf. The coastline in this region is composed of a chain of barrier islands, these islands are usually between two and ten miles long and often less than one mile wide. They are fronted by gently sloped sandy beaches on the seaward side of the island and backed by vast expanses of extremely productive

saltmarsh. Folly Island, located approximately ten miles south of Charleston, is one of more than a dozen such islands in Charleston County. Separating these islands from each other are broad tidal rivers (such as the Stono River) which drain the interior. Tributary to these major rivers, flowing laterally between the islands and the mainland, are series of dendritic tidal creeks which alternately flood and drain the marshes. Folly River is the main artery for such a system of creeks located behind Folly Island. As one proceeds inland, the larger estuaries taper into meandering brackish rivers penetrating into low wooded terrain and farm land. Continuing further upstream, relief increases gradually. At some locations in the interior of the county there are small series of rolling hills, which are relics of beach dunes from previous levels of the sea.

The geologic formations of the Coastal Plain Provinces are comprised of layers of unconsolidated sands and gravels underlain by layers of loams, clays and marls of different ages, all lying nearly horizontal. Soil borings in Folly River behind Bird Key and Folly Island produced fine silty sand to a depth of 20 feet below mean low water, with silt content increasing as one proceeded upstream away from the ocean. Soils analyses are included as Exhibits in Appendix Two.

The climate of the Low Country's barrier islands is marine sub-tropical. The mean average annual temperature near Folly Island is 66°F with an average high temperature in July of 81°F and an average low of 49°F in February. Relative humidity in the area is around 75%, but the

discomforting effect of this high humidity is moderated by an afternoon sea breeze. Precipitation occurs chiefly as rainfall, averages about 50 inches per year, and is fairly well distributed throughout the year. In Charleston, the sun may be seen an average of 65 percent of the time between sunrise and sunset. May and September are the sunniest months. During daylight hours in those months, the sun may be seen as much as 90 percent of the time. These conditions provide Charleston County with a relatively long growing season of 295 days per year. These conditions further allow human comfort the year round and provide a situation that is well suited for outdoor recreation and tourism.

There are some 4,000 acres of saltmarsh in the immediate planning area. These wetland areas play a very important role in the ecology of the area; providing habitat for waterfowl, nursery areas for juvenile stages of many important species of fish and shellfish, water quality improvement, and primary biological production which supports a host of marine life in adjacent coastal waters.

There are public oyster grounds and private leases for oysters and clams in the planning area. Crabbers also fish Folly and Stono Rivers extensively. Shrimp are taken recreationally. The area is a favorite one for local fishermen who catch a dozen different species of fish in and around this estuary.

In short, the major natural resources of the study area are: a temperate climate; topography and soils conducive to agriculture and silviculture (which are important to the County but of little significance within the immediate planning area); geologic features such as a coastal location with sheltered highground areas having access to the

ocean via navigable rivers; the ocean itself harboring abundant biological and mineral resources; long stretches of gently sloped beaches for walking and bathing; and vast expanses of extremely productive saltmarshes which serve as nursery areas for a variety of marine organisms and in turn support large commercial and recreational fisheries.

HUMAN RESOURCES

Historically, Charleston County has been the most populous county in the State. However, in the past decade both Richland and Spartanburg Counties in the upcountry have come to be about equal in population to that of Charleston County.

The population in Charleston County has grown from 216,382 in 1960 to 247,650 in 1970 and 262,400 in 1975. This population is expected to reach 276,000 by 1980. At the same time, the James Island Division has grown from 13,872 in 1960 to 24,197 in 1970, 25,525 in 1975 and is expected to reach 28,090 in 1980. The population of Folly Island has been more stable. In 1960, there were 1,137 permanent residents of Folly Beach; in 1970, there were 1,157 persons and in 1975, the population was 1,500.

It is estimated that Folly Island's resident population increases to about 4,500 persons during the summer months and on peak weekends, visitors to this island may exceed 30,000. The entire Charleston area receives about 2,000,000 visitors each year.

Based on 1970 census, the median school year completed by the 25-year and older segment of the study area was 11.8. This was slightly better than the state average. There are numerous institutions offering post secondary education in the area. The Medical University of South Carolina is located in Charleston and besides offering technical education and health services, the Medical University complex is the third largest employer in the County. The College of Charleston offers liberal arts education and some graduate programs. Liberal arts programs are also offered nearby at the Baptist College at Charleston. The Military College of South Carolina, The Citadel, also offers liberal arts plus an excellent Engineering curriculum. Trident Technical College offers associate degrees in many technical disciplines.

DEVELOPMENT AND ECONOMY

The Federal Government is the largest employer in the area. Other economic activities are recreation and tourism, shipping and trade related activities, education, fisheries, silviculture and agriculture. Recreation, tourism and fisheries activities provide the majority of employment opportunities in the immediate planning area.

Unemployment in Charleston County has been increasing in recent years due in part to a general recession and reduced Military and Government spending in the area. It is locally hoped that increased activity in the tourism, trade and educational areas will offset the reduced military generated employment. Increased efficiency in the fisheries of the planning area would provide more secure employment for those already employed in this sector, and shows some limited potential for increased employment. One resident of Folly Island who owns land fronting on Folly River has

begun plans to open a small marina, another area resident plans to introduce a deep sea fishing head boat which would depart from Folly River. Although, there is no guarantee of success for these ventures, even if a Federally maintained channel is provided, there is virtually no chance of success if existing navigational difficulties persist. Local leaders believe that these types of establishments would add to the attractiveness of the area as a place to visit by day or to rent a cottage and therefore would be a benefit to the entire community. An indication of historical and projected future growth in population, per capita income, and employment in the study area is given in Table 1.

LAND USE ANALYSIS

Only a small percentage of land within the immediate planning area is above mean high water. Most (some 4,000 acres) is tidal salt marsh. The predominant use of high ground areas is for low density residential property. Within the Town of Folly Beach, which is the major political entity in the area, there are approximately 1500 acres of land, half of which is marsh land. Of the remaining 750 acres of high ground, 327 acres remain undeveloped leaving about 420 acres of developed land. Residential properties occupy 204 acres or about half of the presently developed land. There are 1,329 housing units at Folly Beach, most (80%) are single family cottages. Reflecting the resort nature of this shore community, only one third of these units are occupied on a year-round basis.

The second largest category of land use on Folly Island is trans-

TABLE 1

Population, Income and Employment for Charleston SMSA
including
Berkeley, Charleston and Dorchester Counties[1/]

ITEM	YEAR						
	1959	1970	1980	1990	2000	2010	2020
Population	274,909	336,837	316,200	338,200	350,500	363,500	383,200
Total Personal Income (Thousands of 1967 Dollars)	451,033	909,500	1,209,600	1,704,600	2,386,900	3,318,500	4,450,300
Per capita income (1967 $)	1,641	2,700	3,825	5,039	6,808	9,127	11,609
Total Employment	94,533	127,950	131,500	140,900	150,800	160,500	164,500
Employment/Population Ratio	.34	.38	.42	.42	.43	.44	.43
Total Earnings	388,437	784,130	1,018,100	1,403,300	1,930,200	2,654,300	3,534,500
Government	159,244	347,346	420,400	571,100	777,400	1,050,500	1,418,000
Manufacturing	59,228	121,892	167,400	228,400	303,800	401,700	496,400
Wholesale & Retail Trade	57,343	102,107	131,800	174,900	235,000	316,800	407,500
Services	41,924	86,284	138,300	211,300	320,800	484,500	687,900

1/ From projections Economic Activity in South Carolina, Series E Population, December 1975, SADPD-75-1.

portation rights-of-way. The town has a roadnet that occupies 120 acres of land.

Commercial properties occupy only about 20 acres and consist mostly of retail establishments, such as grocery stores, service stations, restaurants and arcades located in the center of the island.

On the northeast end of the island, the U. S. Coast Guard occupies 32 acres from which it operates electronic aids to navigation. The southwest end of the island is presently undeveloped. This parcel is a narrow recurved spit which consists of a mile long primary and secondary dune system backed by salt marsh and the Folly River. Southwest of this end of Folly Island, across a series of sand flats, lies an extremely small island, Bird Key, which serves as a rookery for several species of shore birds.

The remaining 330 acres of high ground included in the immediate planning area are small, unincorporated parcels adjacent to Folly Road and small islands located in the marsh. Land use here is, again, mostly low density residential. Commercial uses include restaurants, shrimp docks, fish houses and commercial recreation areas such as, camping areas, tackle shops and fishing piers.

PROBLEMS AND NEEDS

STATUS OF EXISTING PLANS AND IMPROVEMENTS

The Town of Folly Beach has a desire to grow and develop economically

in such a way that the quality of life is improved for its citizens. This requires increased employment opportunities, improved property values and a tax base sufficient to provide necessary services. These objectives are to be realized through planned redevelopment of the island. The Berkeley-Charleston-Dorchester Regional Planning Council conducted an Engineering Study in 1973 and produced a redevelopment plan for the island. However, local leaders considered the plan infeasible and have commissioned another study to be completed in 1977.

Several water related phenomenon are creating obstacles to redevelopment of the area. One major problem is erosion of the beach fronting the island. This erosion trend discourages investment in the area, causing many structures in the area to fall into disrepair which in turn further discourages investment. The Charleston District Corps of Engineers is presently conducting an Engineering study to determine the feasibility of providing beach erosion control and hurricane protection for the island. This study is scheduled for completion in late 1978.

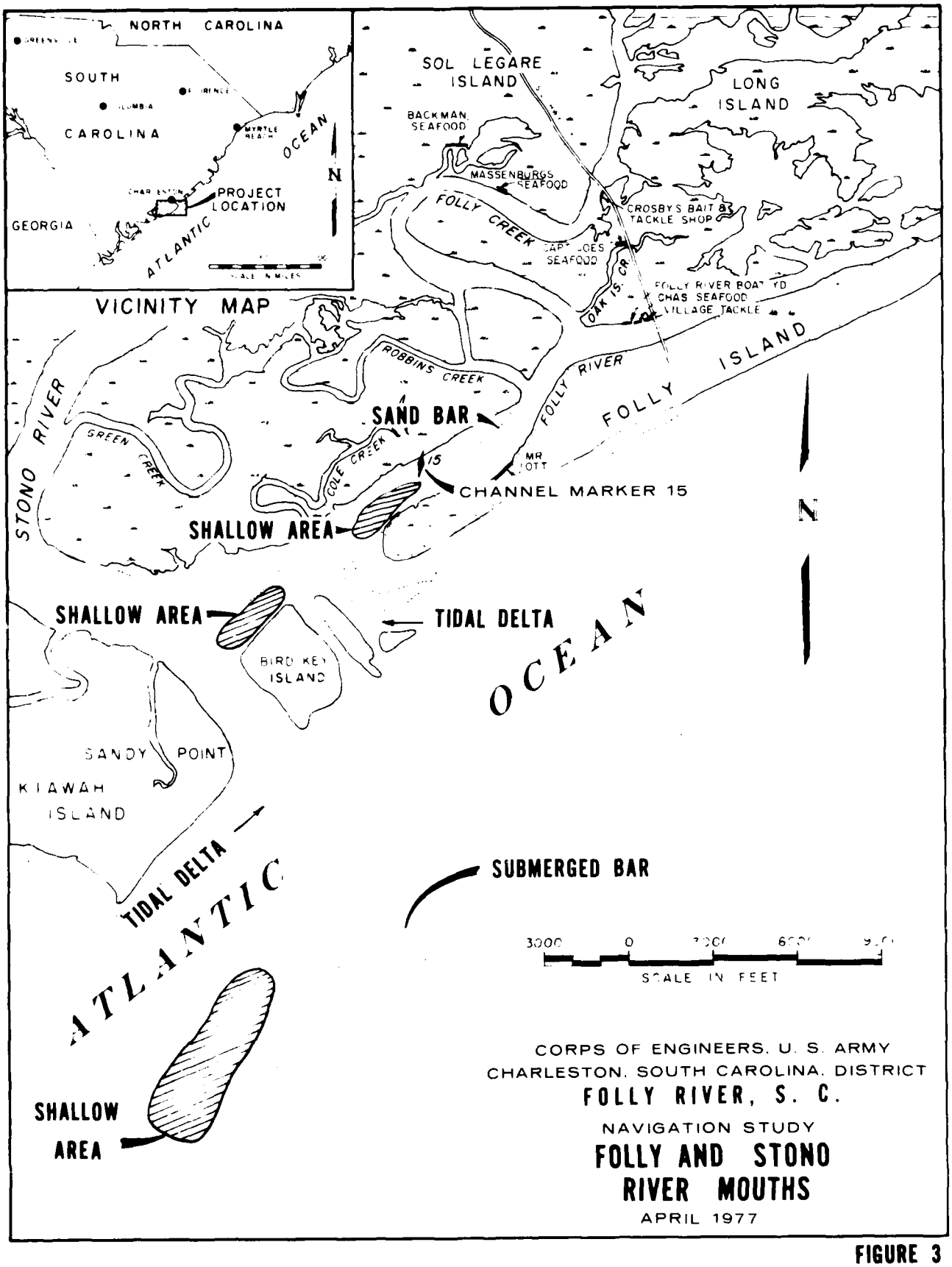
A second related problem effecting the area, of primary concern in this study, is the shoaling of Folly River, which serves as deep-water access to the ocean from the backside of Folly Island. Not only are deep draft commercial shrimpers hampered in their operations but the general attractiveness at the area as a place to reside or rent a cottage is adversely affected by the diminishing controlling depths in Folly River. Sheltered berthing areas with safe and reliable ocean access are important to the future of Folly Island as a shore resort.

NAVIGATIONAL DIFFICULTIES

Shifting shoals in three areas limit access to docking areas in Folly River and Folly Creek. The first shoal is a narrow sand bar located within Folly River about mid-river, running laterally from channel marker 15 upstream to the confluence with Robins Creek. The second shoal is located near the confluence of Folly River with the Stono River behind Bird Key. The third shoal is an offshore bar system located two miles off Stono River Inlet (see Figure 3). In order to get out to fish and return to land their catches, operators of vessels with drafts exceeding three feet must wait for sufficient rise of the tide to safely navigate over the shoals in question. The time that each operator must wait depends on the draft of his vessel and varies between one and five hours. These delays reduce available fishing time and consequently the catch of local fishermen. There are also increased vessel maintenance costs due to running agound on sand bars. In addition to economic losses, there is significant potential for loss of life. The U. S. Coast Guard has had to rescue numerous individuals from stranded vessels at Stono Bar. There are also hardships placed on the captains and crew who are often forced to stay at sea away from home and family because the phase of the tide would not permit their return. This uncertainty of work schedule makes it hard for owners or captains to hire crews.

RECREATIONAL NEEDS

A third water related need that exists throughout the general study area and directly impacts the immediate planning area is the need for public access to the beach. There is a critical need for additional public parking at every public beach along the coast. The South Carolina Outdoor Recreation Plan or "SCORP" and a recent engineering study commissioned by several area resources agencies, "Public Beach Access and Recreation in South Carolina", points out the immediate need for increased beach access throughout the coastal zone especially in proximity to the major urban centers such as Charleston. In fact, present demand for parking places at Charleston area beaches exceeds the supply by two to three times. Both the beach access problem and the island's erosion problem are aggravated by continued residential building along the foredune. Access to the beach is cut off and the erosion protection afforded by the natural dune system is damaged or destroyed.



CORPS OF ENGINEERS, U. S. ARMY
CHARLESTON, SOUTH CAROLINA, DISTRICT

FOLLY RIVER, S. C.

NAVIGATION STUDY

FOLLY AND STONO RIVER MOUTHS

APRIL 1977

FIGURE 3

IMPROVEMENTS DESIRED

A public meeting was held at the Folly Beach community center on the 27th of May 1975 to determine the nature and extent of the improvements desired.

The principal improvements requested at this initial public meeting included deepening of the shoaled areas, mentioned previously, and marking these areas with aids to navigation. Another area of concern, expressed at the public meeting and brought out through interviews with local leaders, concerned citizens and federal and state resource managers, is that measures taken to improve navigation be planned so as to minimize disruption of the local environment. In other words, help for one group of fishermen, commercial shrimpers, should not be at the expense of other groups, the oyster men, crabbers, recreational fishermen, etc.

Yet another water resource related problem which concerns officials of Folly Beach is the human and vehicular congestion occurring in the center of town. This congestion is due to the lack of parking facilities available to accommodate day visitors wishing either access to the beach or to launch recreational craft from the county boat launching ramp, which is located adjacent to the main highway bridge leading to the island, SC HWY 171. Local leaders and the citizenry of Folly Beach have expressed a desire to share water-based recreation with the county and public at large. However, the townspeople believe that the county, state and federal governments should help to provide the necessary facilities so that public access and utilization can proceed without inconvenience to the local permanent population.

FORMULATING A PLAN

Formulating a plan to satisfy the needs of shallow draft navigation within Folly River and to address other related resource needs. involves the consideration of several alternative measures. Each potential solution was considered on the basis of its economic, environmental, and social impacts. To facilitate logical selection of the best plan, each plan and its associated effects were displayed side by side in a system of accounts, presented later under "Methods Used In Comparing Alternative Plans" (See Table 2).

FORMULATION AND EVALUATION CRITERIA

To permit a fair and objective appraisal of the merits and disadvantages of each plan a standard set of evaluation criteria were selected. The selected criteria are:

Fulfillment of planning objectives

Technical feasibility

Economic efficiency

Environmental compatibility

Social acceptability

Institutional implementability

Planning objectives are simply concise statements of what should be accomplished by a successful plan of improvement as articulated by local and professional interests.

The major planning objectives of this study are listed below:

A. To promote the economic development of the country and the region by improving navigation:

a. Provide adequate channel depths

b. Provide stable channel location

c. Provide sufficient aids to navigation - (Mark the channel)

B. Preserve the aesthetic and productive quality of surrounding estuary.

C. Increase the safety, convenience and availability of recreational resources in the area and enhance the planning area as a place to live, work or visit.

Technical feasibility means the ability to accomplish the stated objectives with the men, money, equipment and materials available.

The economic efficiency of a plan is the sum of quantifiable economic benefits attributable to a planned improvement divided by the total cost of providing the improvement. This quotient must exceed unity for a plan to be economically justified; that is, the benefits must exceed the cost for a project to be worthwhile. This test can be applied to each individual measure which is considered for addition to a plan of improvement to determine if it will add or detract from the overall economic efficiency of the plan. This test is necessary but not sufficient in itself for deciding which measures should be added to a plan because many other equally important factors cannot be economically quantified and considered in this single analysis.

An environmentally compatible plan will be one that does not degrade or destroy the natural resources of the area unnecessarily. If one resource is destroyed in utilizing another, the overall efficiency of a plan is dubious. However, almost no action can be taken by man which

does not have some effects on his surroundings; the objective is to plan our actions so as to optimize the overall use of resources over the long term.

The social acceptability of a plan is determined by analyzing its acceptance by the effected public. This was accomplished by a vigorous, though mostly informal, program of public involvement in the planning and evaluation of all alternative plans.

Institutional feasibility involves the ability and willingness of existing political and social institutions to provide the necessary requirements (local share of costs, etc.) to transform the various plans into realities.

POSSIBLE SOLUTIONS

A variety of measures can be taken to address one or more of the planning objectives. The primary objective of facilitating the navigation of shrimp vessels operating out of the Folly River Estuary can be accomplished in one of three ways: First, deepening existing natural channels and improving aids to navigation; Second, by relocating the fleet to docking facilities on deeper water or; Third, replacing the existing fleet with vessels requiring less depth. The latter two alternatives were considered initially but eliminated as impractical, socially unacceptable and unresponsive to other important planning objectives. The reasons for their lack of acceptability stem from the natural desire on the part of local fishermen to use the gear and shorebased facilities which they have already purchased and a hesitancy to relocate their bases and change their method of operation. A cooperative docking and packing facility to be located on the Stono River was considered but the implementability of this

idea was dubious; fishermen were opposed, institutional arrangements were uncertain and authority, under Section 107, doubtful.

As for replacing the fleet, present trends in the South Carolina shrimp fishery are towards larger deeper draft vessels as more versatile, efficient and profitable. Although competitive shallow draft vessels could possibly be designed and built, financing for such unconventional craft would probably be difficult to obtain.

ALTERNATIVES CONSIDERED FURTHER

The first alternative, deepening the existing natural channel, presented several more options which were considered and compared. These options involved route selection, project dimensions, methods of providing and maintaining these dimensions, and dredged material disposal.

Route selection was determined so as to minimize the amount of material to be removed over the project life. This involved comparison of initial dredging amounts and predicted maintenance dredging requirements for several plans. The extent of bottom area disturbed and the frequency of benthic disruptions were also considerations in this analysis.

Project dimensions were determined by comparing costs to be incurred for various project depths with the benfits resulting from each. There is an optimum depth beyond which the added cost of dredging is not compensated

for by increased utility. Channel widths were determined on a rational design basis. Existing fleet requirements are not the sole criteria in this analysis, trends in the industry and channel longevity were also considered.

Technically and economically feasible methods of providing and maintaining project dimensions were limited by the conditions inherent in the authority under which the study was conducted. For example, jetties which were suggested by some local interests, a sand dike proposal to eliminate competing channels between Folly Island and Bird Key and training works to change the course of Folly River were eliminated from consideration early on, because of the controversial nature of these proposals and because construction costs and study costs were beyond the scope authorized under this authority. For this reason, channel modification alternatives centered on various dredging schemes.

Dredged material disposal also presented the interdisciplinary planning team an opportunity for optimization. Material removed from the shoals in Folly River could either be disposed of in the deep and turbulent waters of the Stono River or pumped to the ocean side of adjacent Folly Island. This second disposal option, if included in an environmental quality oriented plan and combined with other enhancement measures, presented the opportunity to utilize the dredged material for beach nourishment on an eroding beach, fronting the undeveloped portion of the island. By cooperating with the Charleston County Park, Recreation and Tourist Commission and participating in the development of the western end of Folly Island into a beach access and biological observation park, the potential created by measures taken in the interest of commercial navi-

gation could be fully developed to address other planning objectives, such as recreation, social well-being, environmental preservation, etc.

ALTERNATE PLANS OF IMPROVEMENT

The first and most straightforward plan which was evaluated in detail, Plan A-1, consisted of following the existing natural channel to the ocean, which is the route presently taken by local fishermen, dredging areas which have become too narrow or too shallow for vessels to pass safely and periodically returning and re-dredging the more persistent shoals. The route which would be followed is shown in Figure 4. Channel dimensions provided and maintained would be a bottom width of 80 feet and a depth of 9 feet below MLW in Folly River and a bottom width of 100 feet with a channel depth of 11 feet at the ocean entrance to Stono River. Dredged material disposal under this plan would be deep water disposal in the Stono River for shoal material removed by pipeline dredge in Folly River and overboard disposal by a Government-owned sidecaster dredge at the ocean entrance channel.

Plan B-1 would follow the main ebb channel in Folly River connecting it with an existing channel through the tidal delta between Bird Key and the end of Folly Island and extending it, through a lunate bar lying off the terminus of this channel, seaward to the eleven foot contour. This route would avoid the Stono River entirely; the proposed route for this plan is shown in Figure 5. Under this option, shoal material would again be disposed of in the Stono River.

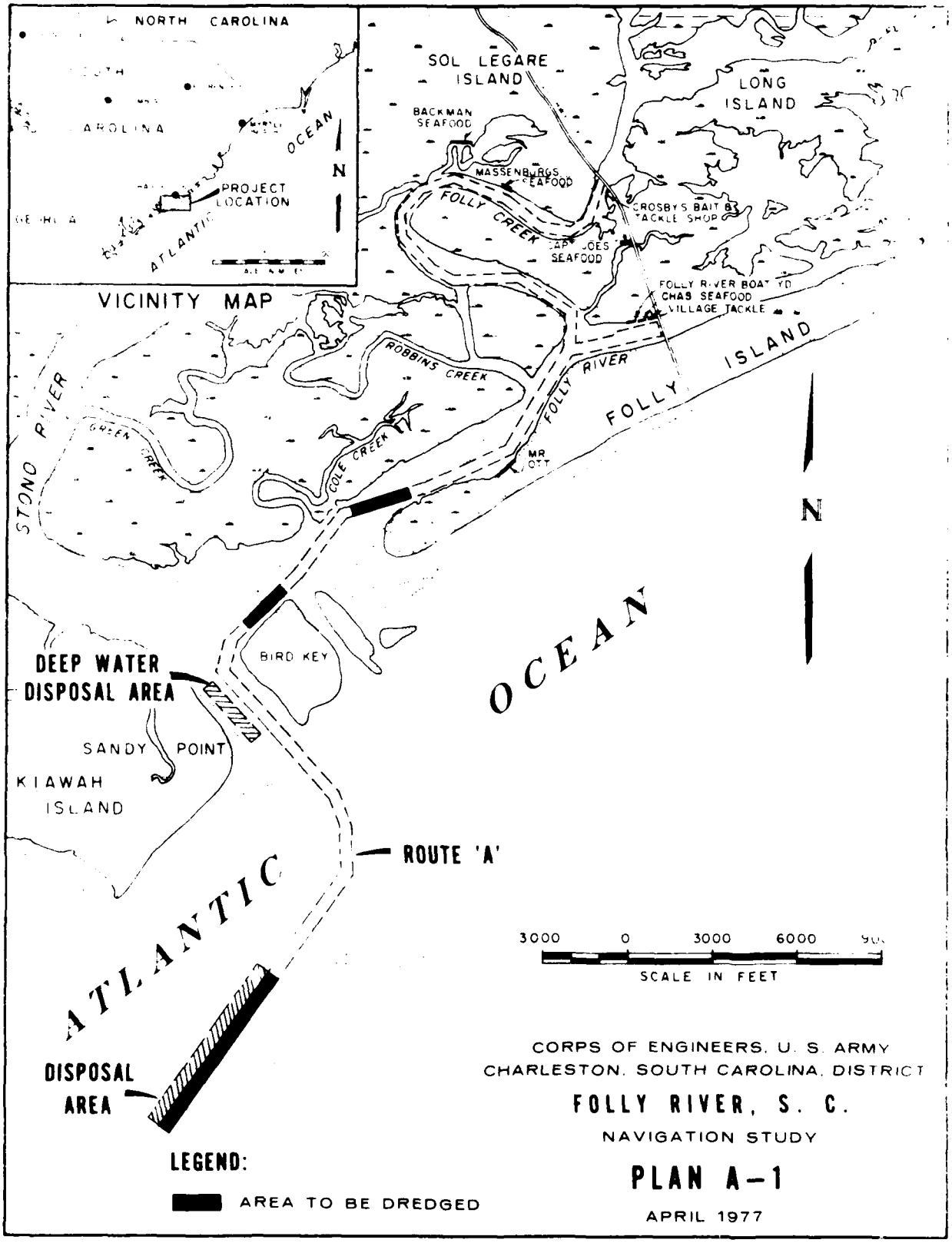
Plan C-1 would follow the same route as plan A-1 in Folly River but

would cut across the natural levee of the Stono on the East side of the River about 1 mile seaward of the mouth of Folly River. This route is shown in Figure 6.

Plans A-1, B-1, and C-1 were formulated to serve the major planning objective, commercial navigation, nearly exclusively, de-emphasizing other planning objectives. In the following plans, measures have been added incrementally to address other planning objectives which, while fulfilling other planning objectives, do not detract from the primary objective of the project.

Plans A-2, B-2 and C-2 are essentially the same as the plans described earlier insofar as Route Selection and project dimensions go, but differ in the method of dredged material disposal. For the plans designated with the alphanumeric symbol ending in the numeral 2, material removed from the shoals in Folly River would be placed on the beach at the western end of Folly Island, (see Figure 7), and used to nourish the eroding beach in this area. The outer shoal at the Stono River bar would still be dredged with a sidecaster dredge employing adjacent overboard disposal. These plans would fulfill the main objective, but in addition would advantageously use the dredged material to address other planning objectives and at little or no additional expense. If this incremental process is carried further, a recreational preservation option could be added to the second series of plans.

Adding this option would further emphasize environmental quality which here refers to both the natural and the human environment.


NORTH CAROLINA
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SOL LEGARE ISLAND
LONG ISLAND
BACKMAN SEAFOOD
MASSENBURGS SEAFOOD
FOLLY CREEK
CROSBYS BAIT & TACKLE SHOP
CAPT JOES SEAFOOD
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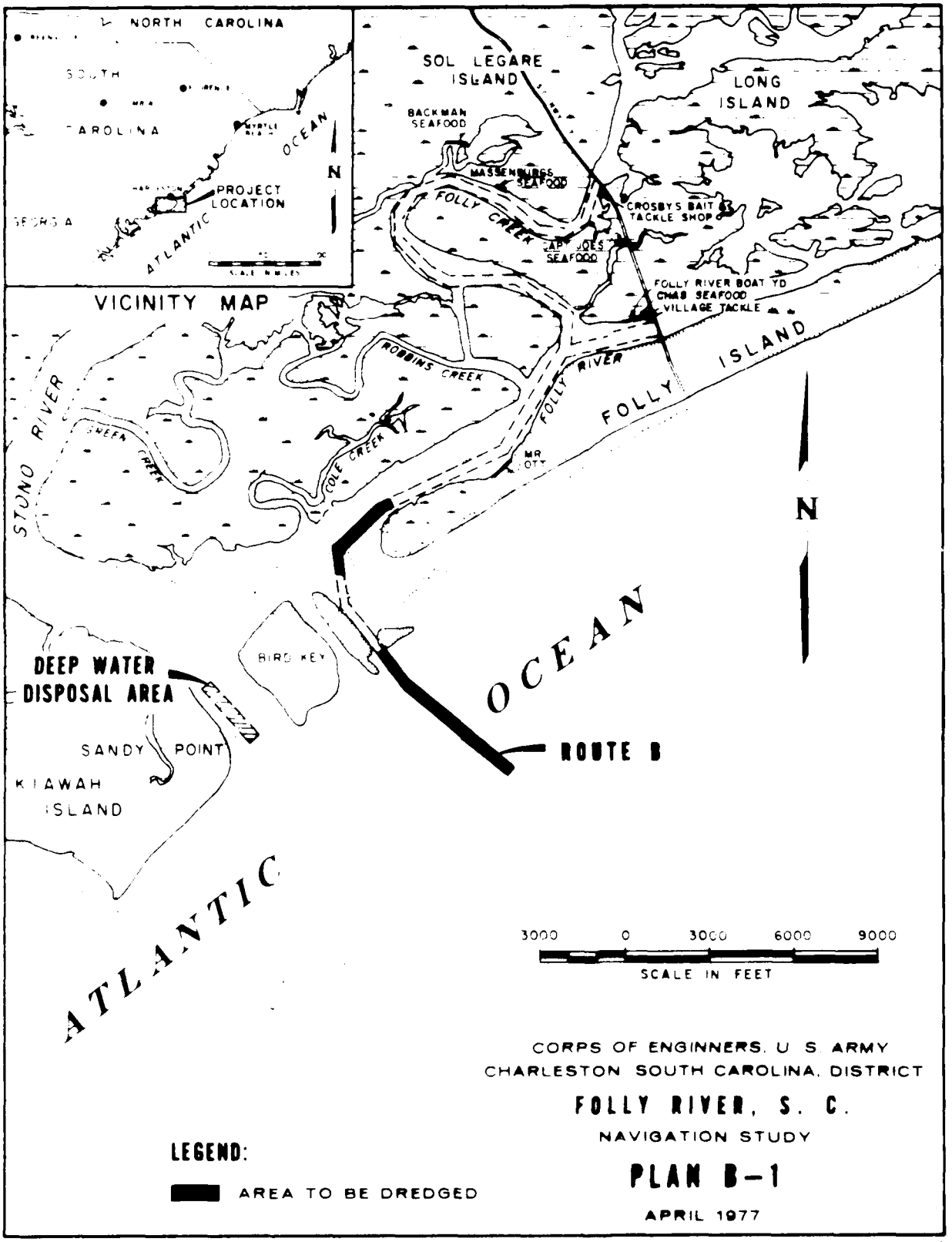
LEGEND:
AREA TO BE DREDGED
CORPS OF ENGINEERS, U. S. ARMY
CHARLESTON, SOUTH CAROLINA, DISTRICT
FOLLY RIVER, S. C.
NAVIGATION STUDY
PLAN A-1
APRIL 1977

FIGURE 4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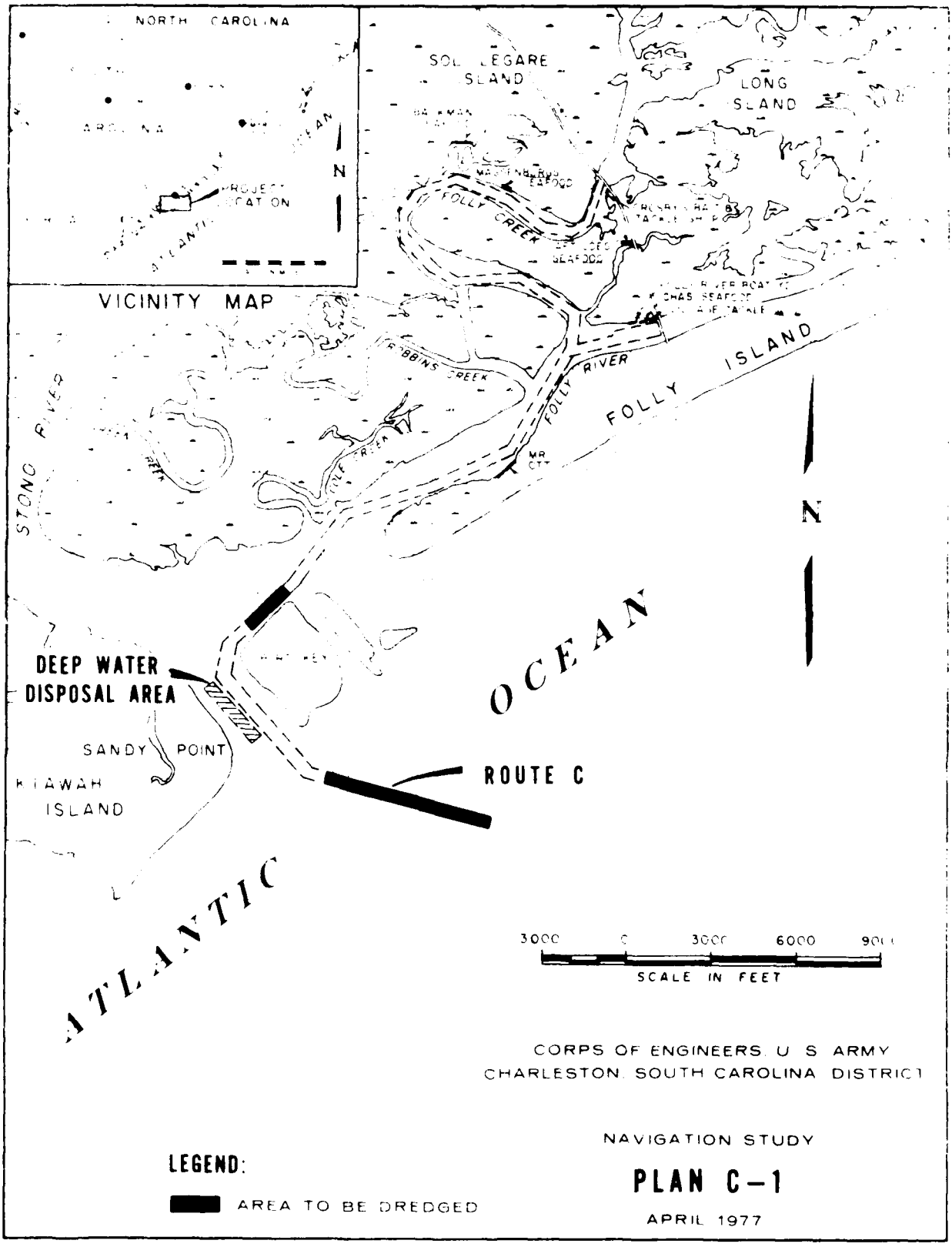
CORPS OF ENGINNERS, U S ARMY
CHARLESTON SOUTH CAROLINA, DISTRICT
FOLLY RIVER, S. C.
NAVIGATION STUDY
PLAN B-1
APRIL 1977
LEGEND:
AREA TO BE DREDGED

FIGURE 5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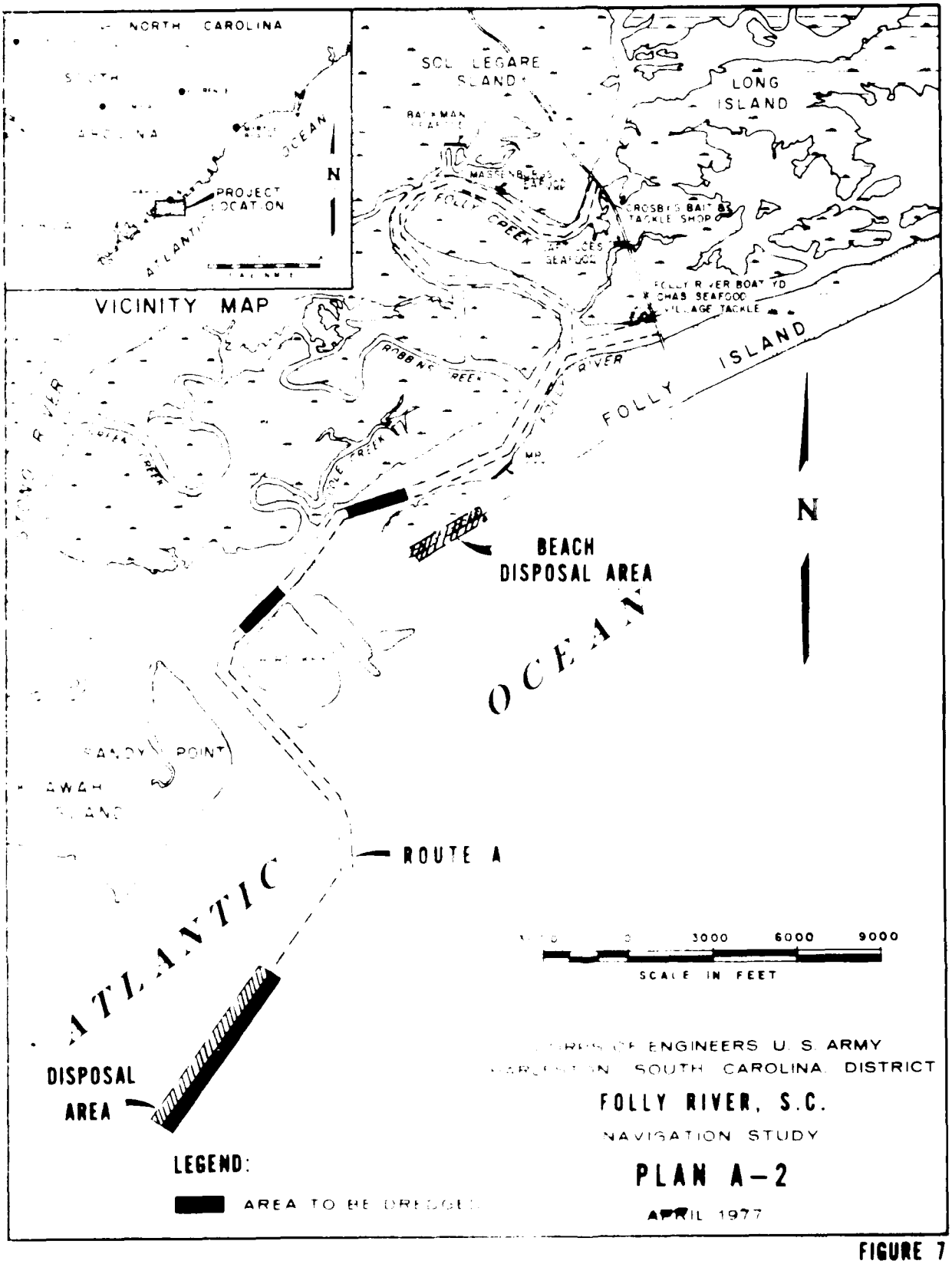
CORPS OF ENGINEERS U S ARMY
CHARLESTON SOUTH CAROLINA DISTRICT
NAVIGATION STUDY
PLAN C-1
APRIL 1977
LEGEND:
AREA TO BE DREDGED

FIGURE 6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FOLLY CREEK
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FOLLY RIVER BOAT YD
CHAS SEAFOOD
VILLAGE TACKLE
FOLLY RIVER
FOLLY ISLAND
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SCALE IN FEET
ENGINEERS U.S. ARMY
SOUTH CAROLINA DISTRICT
FOLLY RIVER, S.C.
NAVIGATION STUDY
PLAN A-2
APRIL 1977
LEGEND:
AREA TO BE DREDGED

FIGURE 7

With the addition of the recreation/preservation option, channel routes and dimensions remain the same and dredged material is used for beach nourishment; in addition, further measures are added to capitalize on the potential created by the use of the shoal material for beach nourishment. These measures would provide public access to the recurved spit area of western Folly Island. Under this option, Charleston County Park, Recreation and Tourist Commission would acquire the undeveloped beach-dune and bay shore area of western Folly Island, between the Atlantic Ocean and Folly River, and with the assistance of the Corps of Engineers, would develop the property into a beach access and biological observation park. Facilities envisioned for this park (shown in Figure 8) are a parking lot for 250 cars, comfort station, boardwalk to the beach and nature trails with interpretive signs. By providing these additional measures, several water related land resource needs would be addressed. First, public access to a high quality beach would be provided at a distance of only 10 miles from the urban center of Charleston. Second, a unique biological and geological resource would be preserved in its natural state rather than be developed in a piecemeal fashion. This preservation measure would also forestall building in an area subject to inundation and extreme erosion during hurricane storm surges, thus reducing the need for expensive corrective measures after the fact.

METHODS USED IN COMPARING ALTERNATE PLANS

Having formulated several alternative solutions to the problems at Folly River, one should be identified for implementation. To determine which course of action to pursue at Folly River, one must identify the benefits to be derived by each of the different plans quantify them if possible,

and compare them with the associated costs involved. A system of accounts will assist us in this matter.

SYSTEM OF ACCOUNTS

The system of accounts is a graphical method of displaying the impacts which several alternate plans will have on the economy, environment and various other areas of concern in a manner that facilitates comparison. The basis for comparison of plans is the future condition which will likely occur if the proposed management measures are not taken. By comparing [illegible] what will happen with and without implementation of various [illegible] the effect of each plan in each area is surfaced.

The format for this table is a two-dimensional array with column headings listing the various plans (including taking no action) and rows listing various items of interest. By filling out this table, a sound [illegible] basis for selecting the best course of action is derived. The benefits and detriments of several plans can be seen at once and compared. To aid in understanding the entries found in the System of Accounts, some discussion of the various accounts and the rationale behind the entries to them is needed.

THE NATIONAL ECONOMIC DEVELOPMENT ACCOUNT

A necessary condition of Federal participation in any water resource project is that the quantifiable economic benefits which will result,

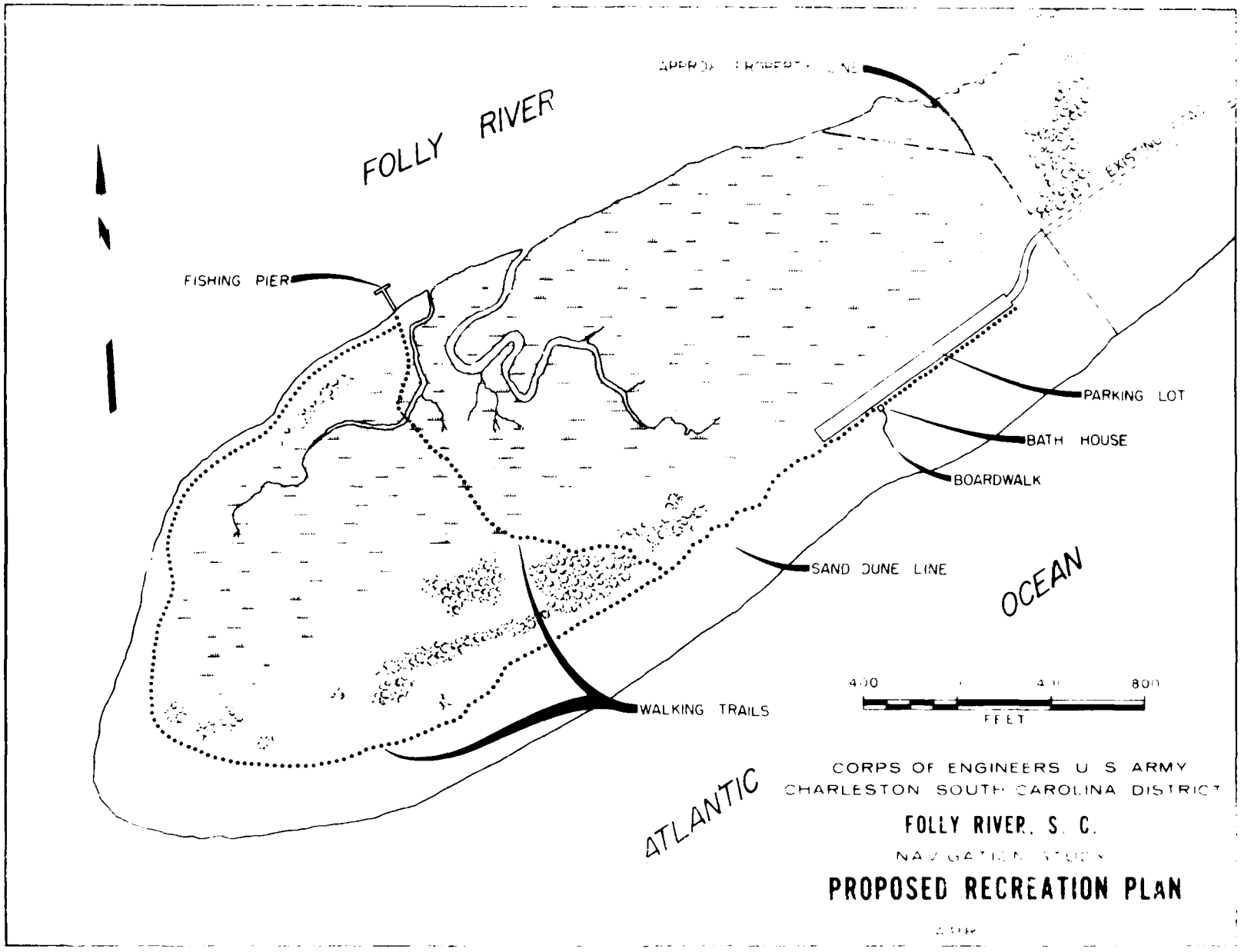
FOLLY RIVER
FISHING PIER
PARKING LOT
BATH HOUSE
BOARDWALK
SAND DUNE LINE
OCEAN
WALKING TRAILS
ATLANTIC
FEET
CORPS OF ENGINEERS U S ARMY
CHARLESTON SOUTH CAROLINA DISTRICT
FOLLY RIVER, S. C.
PROPOSED RECREATION PLAN

FIGURE 8

TABLE 2

SUMMARY EFFECTS ASSESSMENT FOR VARIOUS PLANS
(Summary-Systems of Accounts)

	Take No Action	Plan A-1	Plan A-2 (NED PLAN)	Plan A-2+R (EQ PLAN)	Plan B-1	Plan B-2	Plan B-2+R	Plan C-1	Plan C-2	Plan C-2+R
PLAN DESCRIPTION	Allow channel and surrounding area to remain as is	Route A,Disposal Option 1 Follow existing natural channels in Folly & Stono Rivers. Provide & maintain 80' wide by 9' deep channel in Folly River & 100' wide by 11' deep channel at Stono Inlet. Initial excavation requirements 16,000 cu yds frm Inner (Folly Rvr) channel & 71,000 cu yds frm Stono Inlet.	Route A,Disposal Option 2. Same as Plan A-1 except that dredged material removed from Folly River shoals would be used for beach nourishment on western Folly Island Excavation requirements same as Plan A-1	Route A,Disposal Option 2, plus recreation/preservation measures. Same as Plan A-2 except that recreation option is added to capitalize on dredged material disposal and add environmental contributions	Route B, Disposal Option 1. Follow ebb channel in Folly Rvr, connect it to existing natural channel between Bird Key & Folly Island & extend it through bar to 11' ocean contour. Channel dimensions same as Plan A-1. Initial excavation requirements 9,000 cu yds Inner Channel, 141,000 cu yds Outer Channel.	Route B,Disposal Option 2. Same as Plan B-1 except that material removed frm inner shoals would be used for beach nourishment on western Folly Island. Excavation requirements same as Plan B-1	Route B,Disposal Option 2 plus recreation/preservation measures Same as Plan B-2 except that recreation option is added to captialize on dredged material disposal & add environmental contributions.	Route C,Disposal Option 1 Traditional route (Route A) followed in Folly River but cut across east delta flanking Stono River about 1 mile seaward of Bird Key Channel dimensions same as Plan A-1. Initial excavation requirements Inner Channel 16,000 cu yds, Outer Channel 128,000 cu yds.	Route C,Disposal Option 2 Same as Plan C-1 except that material removed frm inner shoals would be used for beach nourishment on western Folly Island Excavation requirements same as Plan C-1.	Route C,Disposal Option 2, plus recreation/preservation measures Same as Plan C-2 except that recreation option is added to captialize on dredged material disposal and add environmental contributions.
SIGNIFICANT EFFECTS										
(1) Economic	Shrimping operations will continue to be hindered resulting in the loss of income & employment in this fishery & related activities.	$63,500 net avg annual navigation benefits. No recreation benefits. $63,500 Total Avg Annual Project Benefits.	Same as Plan A-1.	$63,500 net avg ann nav benefits. $250,800 net avg ann rec benefits. $314,300 Tot Avg Ann Project Benefits.	$12,600 net avg ann nav benefits. No rec benefits. $12,600 Total Net Avg Ann Project Benefits.	Same as Plan B-1.	$12,600 net avg ann nav benefits. $250,800 net avg ann rec benefits. $263,400 Total Net Avg Ann Project Benefits.	$32,600 net avg ann Benefits No rec benefits. $32,600 Total Net Avg Ann Project Benefits.	Same as Plan C-1	$32,600 net avg ann benefits. $250,800 net avg ann rec benefits. $283,400 Total Net Avg Ann Proj Benefits
(2) Social	Hazardous navigation conditions will continue to hinder & endanger shrimping fleet. Fishing community *may be forced to* relocate. Local employment income & business opportunities will decline Investments needed for upgrading facilities would not be forthcoming	Safe navigation channels will reduce risk of groundings,preserve the employment of the local *fishing community* & improve business opportunities in fisheries,recreation & related activities.	Same as Plan A-1.	Same as Plan A-1 plus recreational and nature education opportunities would be increased. Congestion & beach access problems would be partially addressed. Some tax base would be lost but could be compensated for by revenue sharing with PRT & increased beach access assistance.	Same as Plan A-1	Same as Plan A-1.	Same as Plan A-2+R.	Same as Plan A-1	Same as Plan A-1	Same as Plan A-2+R.
(3) Environmental	Continued shoaling could reduce tidal exchange & discourage investment in pollution control facilities. Development of western spit of Folly Is. would degrade an area of great aesthetic & ecological value.	Water quality would be temporarily degraded in areas around dredge.Open water disposal of dredged material poses some potential for harm to local shellfish beds.	Water quality would be temporarily degraded in areas around dredge. Beach nourishment disposal poses little potential for harm to shellfish & would slightly reduce erosion along western Folly Is.	Same as Plan A-2 except that western spit of Folly Is. would be preserved in near natural state & access to beach would be enhanced. Traffic on the island & consequently noise & emissions could increase.	Same as Plan A-1.	Same as Plan A-2.	Same as Plan A-2+R.	Same as Plan A-1.	Same as Plan A-2.	Same as Plan A-2+R.

Table 2 (cont'd)

SUMMARY EFFECTS ASSESSMENT FOR VARIOUS PLANS (Cont'd)
(Summary-Systems of Accounts)

PLAN DESCRIPTION	Take No Action	Plan A-1	Plan A-2	Plan A-2+R	Plan B-1	Plan B-2	Plan B-2+R	Plan C-1	Plan C-2	Plan C-2+R
PLAN EVALUATION										
Contribution to planning objectives										
(1) (Improve commercial navigation)	No positive contribution	Route A will most efficiently & safely serve navigational needs.	Same as Plan A-1.	Same as Plan A-1.	Route B will least efficiently serve navigational needs & will not serve the needs of vessels accessing the ocean from Stono or Kiawah Rivers.	Same as Plan B-1.	Same as Plan B-1.	Route C is intermediate in serving navigational needs. Outer channel orientation may be too oblique to S.E. waves.	Same as Plan C-1.	Same as Plan C-1.
(2) (Preserve environmental integrity of estuary)	No positive contribution	Least dredging volume & bottom area disturbed. Disposal method potentially harmful to shellfish.	Same volume & area as Plan A-1 but disposal method more environmentally acceptable & reduces beach erosion.	Same as Plan A-2 plus western spit area preserved for beach acce ⌟ & biological obaervation. This plan makes the greatest contribution to environmental quality objectives.	Greatest dredging volume & bottom area disturbed. *Disposal method* potentially harmful to shellfish. This plan would contribute least to environmental quality objectives.	Same volume & area as Plan B-1 but disposal *method more* environmentally acceptable & reduces beach erosion.	Same as for Plan B-2 plus western spit area preserved for beach access & biological observation.	Intermediate dredging volume & bottom area disturbed disposal method potentially harmful to shellfish.	Same volume & area as Plan C-1 but disposal method is more environmentally acceptable & reduces beach erosion.	Same as Plan C-2 plus western spit area preserved for beach access & biological observations.
(3) (Enhance recreation & aesthetics of Planning Area)	No positive contribution.	Improved navigation will enhance aesthetic & recreational quality of the area.	Same as Plan A-1.	Same as Plan A-1 plus park development will increase recreational opportunities in the area and preserve a natural system	Same as Plan A-1.	Same as Plan A-1.	Same as Plan A-2+R.	Same as Plan A-1.	Same as Plan A-1.	Same as Plan A-2+R.
RELATIONSHIP TO FOUR NATIONAL ACCOUNTS										
(1) N.E.D.	No positive contribution.	$63,500 Total Net Avg. Ann. Benefits.	$63,500 Total Net Avg Ann Benefits.	$314,300 Total Net Avg Ann Benefits.	$12,600 Total Net Avg Ann Benefits.	$12,600 Total Net Avg Ann Benefits.	$263,200 Total Net Avg Ann Benefits.	$32,600 Total Net Avg Ann Benefits.	$32,600 Total Net Avg Ann Benefits.	$293,200 Total Net Avg An. Benefits.
(2) E.Q.	No positive contribution.	Increased navigability. Temporary increases in turbidity, possible danger to shellfish.	Increased navigability. Reduced beach erosion. Temporary increase in turbidity, little danger to shellfish.	Increased navigability Reduced beach erosion. Increased beach access, preserved beach dune spit system. Temp turbidity. Slightly increased traffic.	Same as Plan A-1.	Same as Plan A-2.	Same as Plan A-2+R.	Same as Plan A-1.	Same as Plan A-2.	Same as Plan A-2+R.
(3) S.W.B.	No positive contribution.	Safety of commercial & recreational. Navigation increased. Employm't in commercial fishing & related activities preserved. Fishing time & regularity of schedule increased.	Same as Plan A-1.	Same as Plan A-1 plus increased recreation opportunities & preserved open space.	Same as Plan A-1.	Same as Plan A-2.	Same as Plan A-2+R.	Same as Plan A-1.	Same as Plan A-2.	Same as Plan A-2+R.

Table 2 (cont'd)

SUMMARY EFFECTS ASSESSMENT FOR VARIOUS PLANS (Cont'd)

PLAN DESCRIPTION	Take No Action	Plan A-1	Plan A-2	Plan A-2+R	Plan B-1	Plan B-2	Plan B-2+R	Plan C-1	Plan C-2	Plan C-2+R
RELATIONSHIP TO FOUR NATIONAL ACCOUNTS (Cont'd)										
(c) R,D	No monetary benefits Local business opportunities in fisheries & related activities would decline as will related employment opportunities. Out migration of fishery dependent families would probably occur if shoaling continues unabated	Quantifiable monetary benefits same as NED above. Local business opportunities in fisheries & related activities would be increased. Out migration of fishing community would be avoided.	Same as Plan A-1.	Same as Plan A-1 plus tourist related trade & business opportunities would be increased.	Same as Plan A-1.	Same as Plan A-2.	Same as Plan A-2+R.	Same as Plan A-1.	Same as Plan A-2.	Same as Plan A-2+R.
PLAN RESPONSE TO ASSOCIATED EVALUTION CRITERIA										
(1) Acceptability	N/A	This plan is acceptable to locals & navigation interests but area resource managers find open water disposal less acceptable than beach nourishment	This plan is acceptable to locals & navigation interests & more acceptable to area resource managers.	This plan is preferred by area resource managers, PRT and the general public. However, many local residents are opposed to development of a public access park on Folly Island.	This plan is acceptable to Folly River navigation interests but Stono & Kiawah River interests would not be served by such a plan.	Same as Plan B-1.	Recreation aspects meet some local opposition.	This plan is acceptable but not preferred by area navigation interests.	Same as Plan C-1.	Recreation aspects meet some local opposition.
(2) Completeness	Does not address planning objectives.	All steps necessary to achieve navigation objectives are included as part of the plan EQ objectives not addressed.	All steps necessary to achieve navigation & some to achieve EQ objective included. Recreation objectives not addressed.	All steps necessary to achieve navigation, EQ & recreation objectives are included in the plan most complete of all plans considered.	Same as Plan A-1.	Same as Plan A-2.	Same as Plan A-2+R.	Same as Plan A-1.	Same as Plan A-2.	Same as Plan A-2+R.
(3) Efficiency and Effectiveness	Ineffective	Effective in addressing navigation objectives but inefficient in disposal method.	Same as Plan A-1 but more environmentally acceptable disposal option	Most effective plan addresses all planning objectives well.	Least effective route, considered less efficient dredging option.	Least effective route, efficient disposal option	Least effective route, efficient disposal option, addresses recreation well.	Effectiveness & efficiency of route intermediate between A & B, disposal option least efficient.	Intermediate route, efficient disposal option.	Intermediate route, efficient disposal option, addresses recreation well
(4) Geographical Scope	Limited to immediate planning area	Limited to immediate planning area	Same as Plan A-1.	Same as Plan A-1.	Same as Plan A-1.	Same as Plan A-1	Same as Plan A-1.	Same as Plan A-1.	Same as Plan A-1.	Same as Plan A-1.
(5) Reversibility	N/A	All plans could be reversed with little difficulty.	Same as Plan A-1.	Same as Plan A-1.	Same as Plan A-1.	Same as Plan A-1.	Same as Plan A-1.	Same as Plan A-1	Same as Plan A-1.	Same as Plan A-1

Table 2 (cont'd)

SUMMARY EFFECTS ASSESSMENT FOR VARIOUS PLANS (Cont'd)

PLAN DESCRIPTION	Take No Action	Plan A-1	Plan A-2	Plan A-2+R	B-1	B-2	B-2+R	C-1	C-2	C-2+R
IMPLEMENTATION RESPONSIBILITY										
(1) Federal	N/A	100% of construction & maintenance costs for channel improvements.	Same as Plan A-1.	100% of channel improvement costs plus 50% of initial recreation facilities development cost but no maintenance.	Same as Plan A-1.	Same as Plan A-1	Same as Plan A-2+R	Same as Plan A-1	Same as Plan A-1.	Same as Plan A-2+R.
(2) Non-Federal	N/A	Land easements & rights-of-way, utilities modifications, public accessways, commensurate depths at berthing areas & protect water quality.	Same as Plan A-1.	Same as Plan A-1 plus acquire land for park development & dedicate it to public outdoor recreation. Operate & maintain the park keeping it open to all on an equal basis.	Same as Plan A-1	Same as Plan A-1.	Same as Plan A-2+R	Same as Plan A-1.	Same as Plan A-1.	Same as Plan A-2+R.

regardless of to whom they accrue, must exceed the cost of obtaining them. Monetary benefits and costs are compared in the NED Account.

BENEFITS ATTRIBUTABLE TO NAVIGATIONAL IMPROVEMENTS

The economic benefits which would result from improving navigation at Folly River stem from increasing the productivity of the local shrimping industry in two ways. First, by increasing available fishing time through elimination of delays now caused by having to wait for high tide in order to operate fishing vessels safely. This increase in fishing time should result in larger catches and increased revenues if other factors aren't limiting. Second, by eliminating accidental hull damages sustained by vessels attempting to transit shoals with too little under-keel clearance.

The latter category of benefits can be quantified by determining the amount of damage attributable to shoaled conditions with and without each plan and taking the difference as the annual benefit from vessel damage reduction.

The former category of benefits, those resulting from increased catches, can be estimated by:

1. Determining the amount of delays experienced, or conversely, how much more time each boat could fish with an improved channel;
2. Estimating the amount of shrimp that will be caught during this interval and its gross monetary value;

3. Estimating the added cost of utilizing the additional time available for shrimping;
4. Subtracting the added costs from the increased value of the catch to determine the net increase in revenue attributable to the channel improvement.

Further explanations of this method of analysis can be found in Section F of Appendix One.

COST OF NAVIGATIONAL IMPROVEMENTS

The cost of improving the channel will be dependent on two factors, the volume of material to be removed, which is a function of existing and proposed channel dimensions, and the proximity of a suitable disposal area. These are different for different routes.

BENEFITS ATTRIBUTABLE TO RECREATION/PRESERVATION MEASURES

To quantify the monetary benefits which will result from the development of a beach access/biological observation park on western Folly Island, two figures must be estimated: the amount of visitation expected at such a park (visitor days); and the dollar value of each such visitor day. Visitation rates have been estimated to be equivalent to 303 thousand persons each year. The value of each visitor day is estimated at one dollar per visitor day.

The methods used to estimate these figures are given in the Appendix One, the results are shown in the System of Accounts.

COST OF RECREATION/PRESERVATION MEASURES

The cost of developing a beach access/biological observation park on Folly Island would be: the acquisition cost of the land; the engineering and construction cost of the facilities contemplated, and the maintenance costs required to operate the park for the next fifty years. The removal of the property in question from the tax base of the local community must also be considered in deciding on the inclusion of the recreation/preservation option.

To include Federal assistance in the development of such a park as a part of the overall project, the recreational benefits derived over the life of the project must exceed the cost of the recreational improvements without regard to the navigation project. That is, the recreation option must pay its own way to be included in the selected plan of improvement.

OTHER PLAN EFFECTS

Because monetary effects are relatively easy to quantify, there is a tendency to over rely on them when comparing the merits of various plans. However, other effects, not so easily quantified, must be considered if a truly rational selection is to be made. For example, one channel orientation may be shorter and cheaper than another but may expose vessels using the channel to greater risk of grounding because the angle of approach of certain seasonal waves. If the risk can be reduced significantly for a reasonable increase in project cost, the more expensive but safer channel

should be selected. To insure that such non-monetary considerations are included in the selection of the best plan, several additional accounts are included in the System of Accounts.

THE ENVIRONMENTAL QUALITY ACCOUNT

The Environmental Quality or EQ Account contains entries which indicate the significant effects each plan will have on both the natural and the human environment. It should be noted that many possible effects have been considered which are not listed in this account. If a plan is expected to have little or no significant effect in a particular area, then for the sake of brevity, no entry has been made.

THE SOCIAL WELL BEING ACCOUNT

The SWB Account weighs the effects of each plan in areas that are intangible such as, the effect of a plan on the integrity of the family structure, the cohesiveness of communities, or the life styles, health and well being of the people affected.

THE REGIONAL DEVELOPMENT ACCOUNT

This account describes the effect of each plan on regional income and employment, etc. Only a cursory assessment of these regional effects was performed, therefore, entries to this account have been limited to qualitative descriptions of probable effects.

SELECTING A PLAN

ROUTE SELECTION

Of the three routes considered, Route A, the route now used by commercial vessels, would require the least dredging. This is true for the initial dredging amount as well as projected maintenance requirements. Route A would disturb less bottom area than the other routes considered. The orientation of Route A is also believed to be the safest in terms of prevalent sea conditions and approach routes. Route A will also best serve the needs of recreational craft entering or leaving from landings on Kiawah and Stono Rivers. Economic benefits for all channel routes are equal so the route requiring the least dredging (Route A) should be selected.

PROJECT DIMENSIONS

In comparing projections for benefits and cost of providing increasingly deeper channels, a depth of 9 feet inside Folly River and 11 feet at the Stono River Entrance Channel provided the greatest excess of benefits over costs, (See Appendix One, Section F, "Maximization"). These channel depths should be safer, according to damage reduction projections and should decrease the frequency of demand for maintenance dredging. Channel bottom widths of 80 and 100 feet,respectively, were selected on a rational design basis to allow for the set and drift of tidal currents and other navigational variables.

DREDGED MATERIAL DISPOSAL

Due to the proximity of both disposal areas to the shoals requiring dredging and the consequent equality of costs, the beach nourishment disposal option was selected as being the more environmentally acceptable.

RECREATION/PRESERVATION MEASURES

The measures necessary to develop and manage the recurved spit on western Folly Island as a beach access and biological observation park were found to be incrementally justified. That is, they could be included without reducing the overall economic efficiency of the navigation project while at the same time adding significantly to the general benefits of the project. Institutional arrangements to manage the park and share parking fees with the City of Folly Beach so as to offset the tax loss to them seem achievable. Consequently, Corps of Engineers participation in the park development has been included in the Selected Plan of Improvement.

THE NED AND THE EQ PLANS

Plan A-2 has been formulated with all necessary formulation criteria considered: it will adequately serve the needs of local fishermen; it is economically justified and acceptable, both socially and environmentally. Therefore, the basic navigation project has been designated the NED Plan.

Plan A-2+R which includes, in addition to the basic navigation project, the recreation/preservation option, will make the best contribution to environmental quality objectives. The recreation/preservation option is incrementally justified and will add to the overall economic efficiency of the project. Therefore, Plan A-2+R has been designated the EQ Plan.

THE SELECTED PLAN

This section presents an overall view of the Selected Plan and its effects. It also discusses significant design, construction and maintenance aspects of the plan.

PLAN DESCRIPTION

The Selected Plan (Plan A-2+R) would provide shallow draft navigation improvements as follows:

a. Stono Inlet Entrance Channel. An entrance channel 11 feet deep by 100 feet wide would extend from the 11-foot contour in the Stono River through the shoal lying off the river mouth to the 11-foot contour in the ocean; a distance of approximately one nautical mile.

b. Folly River Channel. A channel within Folly River 9 feet deep and 80 feet wide, extending downstream from U. S. Highway 171 to the confluence of Folly and Stono Rivers; a distance of approximately three nautical miles.

c. Folly Creek Channel. A channel within Folly Creek 9 feet deep by 80 feet wide extending downstream from Highway 171 to the confluence with Folly River; a distance of approximately three nautical miles.

The locations of these channels are shown on Plates 1, 2 and 3.

Because the lack of depth and rough seas encountered off shore at Stono Inlet prohibit the use of a pipeline dredge, the Stono Inlet Entrance Channel would be excavated with a sidecaster dredge which is designed for such conditions. The shoals in Folly River would be removed using a pipeline dredge. The shoal material removed would be pumped to the front beach on western Folly Island. Sample cores of this material have been visually examined and subjected to grain size analysis. These tests indicate that the material in question would be suitable for beach nourishment.

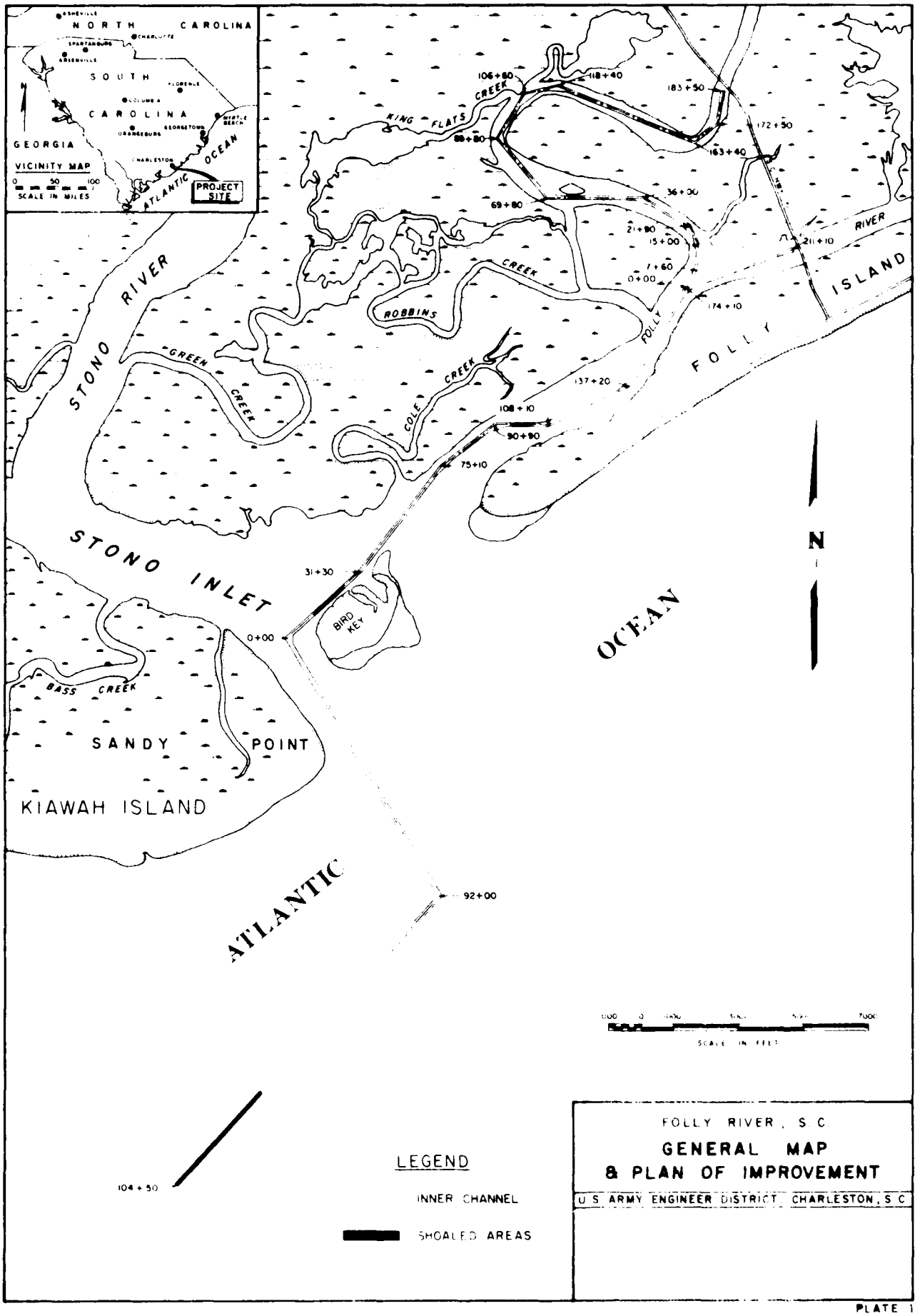
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
ATLANTIC OCEAN
PROJECT SITE
VICINITY MAP
SCALE IN MILES
106+80
118+40
183+50
KING FLATS
CREEK
88+80
172+50
163+40
36+00
69+80
21+80
15+00
7+60
0+00
211+10
RIVER
ISLAND
FOLLY
ROBBINS
CREEK
174+10
STONO RIVER
GREEN CREEK
COLE CREEK
137+20
108+10
90+90
75+10
STONO INLET
31+30
BIRD KEY
0+00
OCEAN
N
BASS CREEK
SANDY POINT
KIAWAH ISLAND
ATLANTIC
92+00
SCALE IN FEET
104+50
LEGEND
INNER CHANNEL
SHOALED AREAS
FOLLY RIVER, S.C.
GENERAL MAP
& PLAN OF IMPROVEMENT
U.S. ARMY ENGINEER DISTRICT, CHARLESTON, S.C.

PLATE 1

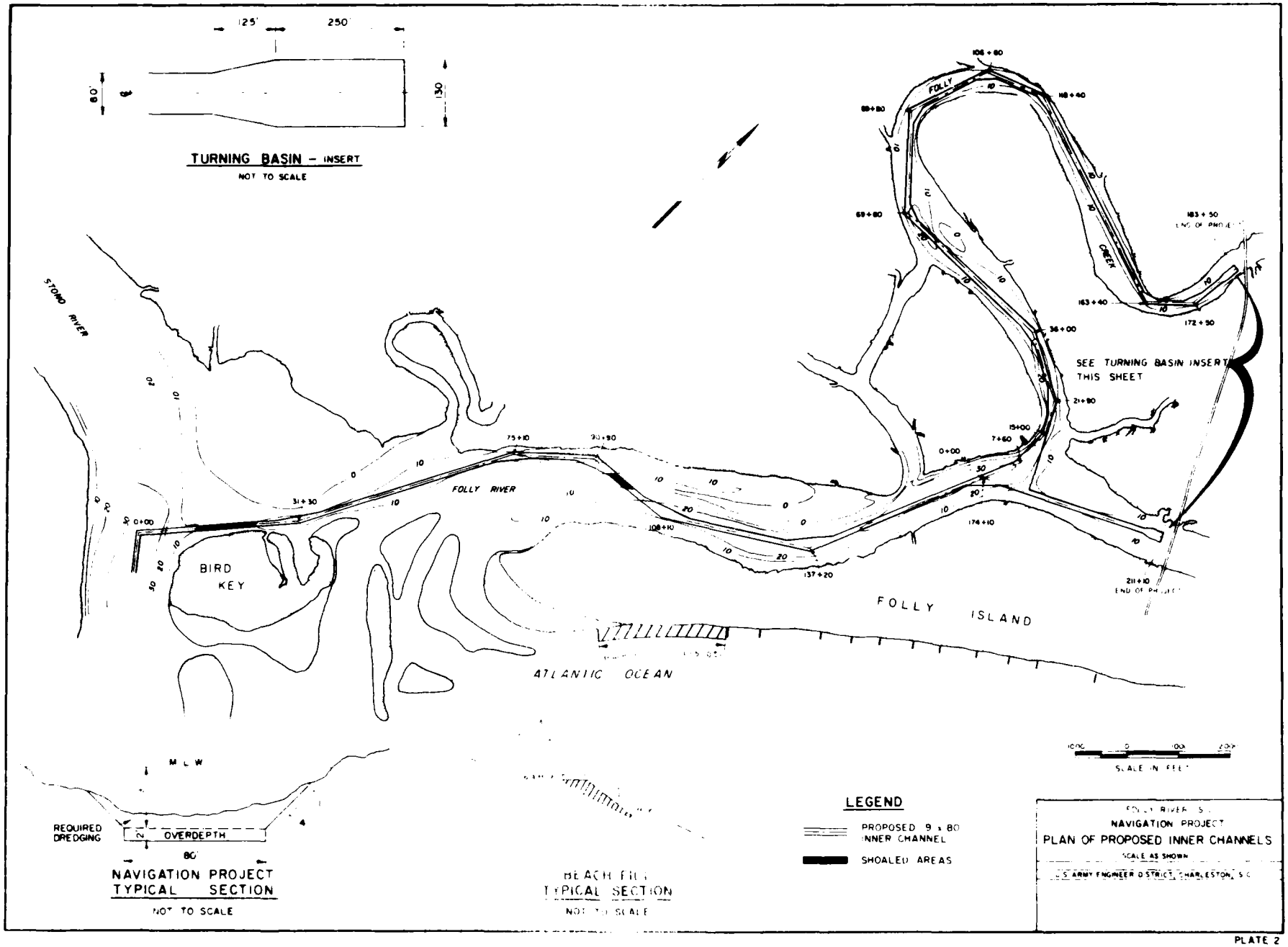
125'
250'
80'
30'
TURNING BASIN – INSERT
NOT TO SCALE
STONO RIVER
FOLLY RIVER
FOLLY CREEK
BIRD KEY
FOLLY ISLAND
ATLANTIC OCEAN
SEE TURNING BASIN INSERT THIS SHEET
106+80
88+80
69+80
183+50
END OF PROJECT
163+40
172+50
36+00
21+80
15+00
7+60
0+00
75+10
93+90
31+30
108+10
137+20
174+10
211+10
END OF PROJECT
M L W
REQUIRED DREDGING
OVERDEPTH
80'
NAVIGATION PROJECT
TYPICAL SECTION
NOT TO SCALE
BEACH FILL
TYPICAL SECTION
NOT TO SCALE
LEGEND
PROPOSED 9 x 80 INNER CHANNEL
SHOALED AREAS
100' 0 100' 200'
SCALE IN FEET
FOLLY RIVER, S.C.
NAVIGATION PROJECT
PLAN OF PROPOSED INNER CHANNELS
SCALE AS SHOWN
U.S. ARMY ENGINEER DISTRICT, CHARLESTON, S.C.

PLATE 2

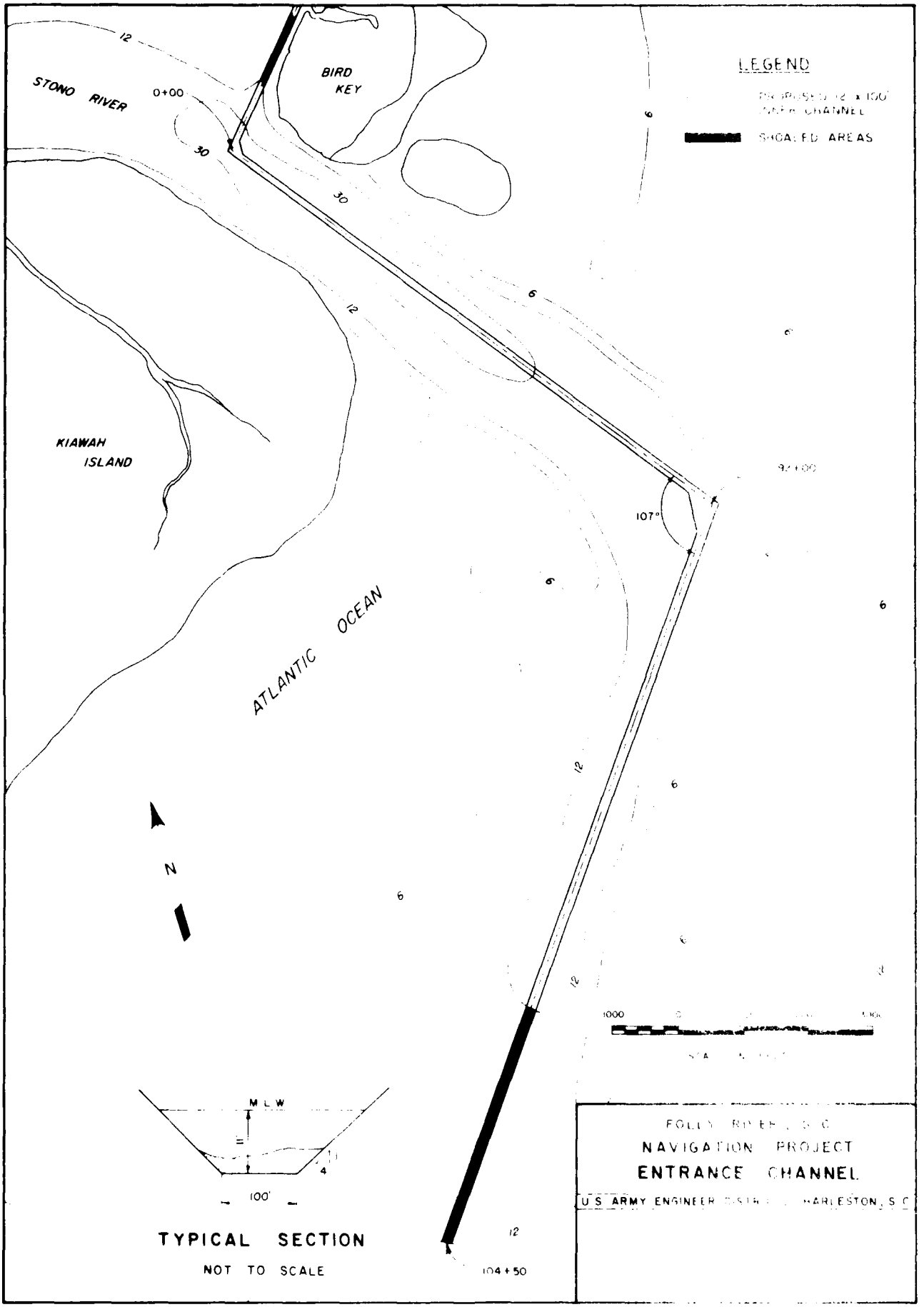
LEGEND
PROPOSED 12 x 100' MLLW CHANNEL
SHOALED AREAS
STONO RIVER
0+00
BIRD KEY
KIAWAH ISLAND
ATLANTIC OCEAN
12
30
6
107°
94+00
104+50
N
1000
M L W
4
100'
TYPICAL SECTION
NOT TO SCALE
FOLLY RIVER, S. C.
NAVIGATION PROJECT
ENTRANCE CHANNEL
U.S. ARMY ENGINEER DISTRICT, CHARLESTON, S.C.

PLATE 1

Navigation aids would consist of lights, ranges and day beacons placed and maintained by the Coast Guard. The Coast Guard Plan of Installation is contained in Exhibit 14A of Appendix Three.

The selected plan of improvement would also provide for the Corps of Engineers to assist Charleston County Park, Recreation and Tourist Commission with the development of a Beach Access and Biological Observation Park on the recurved spit at the western end of Folly Island (as shown earlier in Figure 8); provided PRT is able to make the necessary institutional arrangements and desires to proceed with the development of the park.

PLAN ACCOMPLISHMENTS

The major benefits that would result from implementation of the selected plan are: increased productivity of the local shrimping fleet, reduced vessel damages and increased recreational opportunities in the area. It is estimated that the annual catch landed by the Folly River fleet could be increased by 86,000 pounds resulting in an increase in net revenues of $138,400. Vessel damages could be reduced by $9,800 each year. The dollar value of increased recreational opportunities is estimated to be $303,000 per year.

Other tangible benefits would be: unevaluated secondary economic benefits that will accrue to people and businesses in the area who process the catch,supply fuel, ice, gear, etc.; increased safety of recreational vessels using the inlet; an increase in the time captains and crews can spend with their families; a more predictable future for the fishing industry and therefore, increased incentive to invest in improved facilities or to

diversify into other less exploited fisheries.

EFFECTS OF THE PLAN ON THE ENVIRONMENT

In the three areas where dredging would be required, benthic organisms would be disturbed or destroyed. Repopulation from adjacent undisturbed areas should occur quickly since the composition of the bottom (fine shifting sand) would not be altered. The same would be true in areas where the shoal material is deposited. Because of the sandy nature of the shoal material, some localized increase in turbidity would be experienced during dredging operations. The increase in turbidity, although localized, would have a detrimental effect on those organisms which cannot escape the plume around the dredging and discharge areas. Some reduction in dissolved oxygen concentration may also be experienced in the immediate vicinity and concentrations of other chemical constituents contained in the sediments may be increased. All of these effects, however, should be localized and transitory. The visual appearance of the area would not be altered except that there should be more dry beach fronting the dunes in the vicinity where the dredged material is deposited and some park facilities (driveway, parking lot, bath house and board walk) will be situated in the back dune area of the recurved spit. Although some changes in the spit area will occur due to the park development, the effects of residential development on the area, which is the probable alternate future activity, would be far more detrimental environmentally. The recreation option could cause some increase in street traffic in the immediate vicinity with its attendant noise and pollution, etc., but these should be manageable. More comprehensive information is contained in the accompanying Environmental Assessment. A summary of the Section 404 evaluation is presented as Appendix 4.

DESIGN

The selected channel improvement was designed in accordance with accepted practice and was sized to accommodate the fleet of shrimp trawlers presently operating out of Folly River. A project of these dimensions should be more than sufficient to serve recreational craft expected to use the inlet as they are usually smaller and require less depth than the commercial vessels for which the channel was designed. The design of the park and its features is a result of a cooperative effort between the Charleston District, PRT and other local, state and federal resource agencies.

CONSTRUCTION

In the case of the navigation project, once the necessary equipment has been mobilized, the actual time required to obtain project dimensions is only two months. However, considerable lead time is required to obtain approvals, funding, permits, etc., and to schedule the work for the proper time of year. The work should be scheduled for late winter after winter storms have passed and biological activity is at a low ebb The facilities construction for the beach access park is uncomplicated and would probably be performed on a contract basis by a local small business firm.

OPERATION AND MAINTENANCE

The operation and maintenance for this project would be fairly routine. Maintenance dredging in the entrance channel would be required

every several years and would be performed with a sidecaster dredge. Maintenance of the inner channel would be less frequent and would be accomplished on a contract basis with a pipeline dredge. Charleston County would be responsible for the operation and maintenance of the proposed park.

ECONOMICS OF THE SELECTED PLAN

This part of the report discusses the economic aspects of the selected plan. It covers, methodology benefits, costs and economic justification.

METHODOLOGY

The tangible economic justification of the proposed improvement can be determined by comparing the equivalent annual charges (i.e. interest, amortization and maintenance costs) with an estimate of the average annual benefits which would be realized over the 50-year period of analysis. Values given to costs and benefits at their time of accrual are made comparable by conversion to an equivalent time basis using an interest rate of 6-3/8 percent.

COSTS OF NAVIGATIONAL IMPROVEMENTS

The estimated first costs and annual charges for the navigation aspects of recommended plan of improvement, based on December 1976 prices, are summarized in Table 3. An allowance of 25 percent for contingencies is included. All estimates include allowances for engineering, design, supervision and administration. Allowances have also been made to cover the cost of periodic maintenance dredging. Interest and amortization charges are based on an interest rate of 6-3/8 percent and a project life of 50 years.

TABLE 3

NAVIGATION PROJECT COSTS

ITEM	AMOUNT
First Costs	
Initial Dredging	
Entrance Channel	$167,000
Inner Channel	89,000
Navigation Aids	10,000
TOTAL	265,000
Annual Costs	
Interest and Amortization	17,700
Maintenance	
Entrance Channel	51,000
Inner Channel	15,000
Navigation Aids	1,000
TOTAL	$84,700

NAVIGATION BENEFITS

Benefits to be derived from channel improvements consist of returns from increased catches and reduction of vessel damages. Benefits would also be derived from increased safety of recreational craft using the inlet and from security of employment for many people who are dependent on the local fisheries both commercial and recreational. All monetized benefits are based on 1976 price levels and are summarized in Table 4:

TABLE 4

AVERAGE ANNUAL NAVIGATION BENEFITS

ITEM	AMOUNT
Returns on Increased Catches	$138,400
Vessel Damage Reduction	9,800
TOTAL	$148,200

JUSTIFICATION OF THE NAVIGATION PROJECT

Table 5 indicates how the average annual benefits compare with the average annual costs for the navigation project:

TABLE 5

SUMMARY OF ECONOMIC ANALYSIS FOR THE NAVIGATION PROJECT

ITEM	AMOUNT
Average Annual Benefit	$148,200
Annual Cost	84,700
Benefit Cost Ratio	1.7

RECREATION BENEFITS

Recreation benefits for the proposed beach access/biological observation park have been calculated by projecting the rate of utilization (user days per year) of the proposed facility and multiplying this figure by the dollar value of each visitor day. The expected utilization of this park would be approximately 303,000 visitor days per year. Each visitor day, for the purpose of economic analysis, has been valued at one dollar. Thus, the annual benefit attributable to increased recreational opportunities in the planning area would be $303,000.

RECREATION COSTS

The equivalent annual costs of developing the proposed park including purchase of the land, designing and building the facilities, interest amortization over 50 years and maintenance, would be approximately $52,200.

JUSTIFICATION OF RECREATION OPTION

The estimated annual benefits, the estimated annual costs and the ratio of benefits to costs which are shown in Table 6 indicate that the proposed recreation option would be economically justified on its own merits and could be included in the overall plan with no loss of economic efficiency.

TABLE 6

SUMMARY OF ECONOMIC ANALYSIS

FOR

THE RECREATION OPTION

ITEM	AMOUNT
Average Annual Benefit	$303,000
Average Annual Cost	52,200
Benefit Cost Ratio	5.8

DIVISION OF PLAN RESPONSIBILITIES

The purpose of this section is to present the division of responsibilities between Federal and Non-Federal interests in connection with development of the proposed project. The procedures follow the guidelines established for local cooperation in general navigation projects.

COST ALLOCATION

The economic benefits that will accrue to the local commercial fishing industry due to navigational improvements at Folly River are considered to contribute to the national economy. Therefore, all costs associated with the navigation project (except utility relocations, provision of public landing or wharf and provision of acceptable disposal areas) will be borne by the Federal Government.

In the case of the Recreation Option, the residents of the general study area, Charleston, Berkeley and Dorchester Counties, will be the primary beneficiaries; consequently, the construction costs for development of the park will be shared with the Federal Government on a fifty-fifty basis.

COST APPORTIONMENT

Sharing of costs between Federal and non-Federal interests for the Folly River Navigation Project is based on the standard requirements established as Federal policy for "small navigation projects". Under this policy, non-Federal interests are required to furnish all lands, easements and rights-of-way required for project construction and proper maintenance. Non-Federal interests are also required to bear the costs of modifications to all utilities and highway crossings required for project construction and must bear all costs in excess of the $2,000,000 Federal cost limitation. The recommended navigation project will require no modifications to utilities or highway crossings and will be well within the cost limitation dictated by the 107 authority. Maintenance costs, except for disposal easements, will be a Federal responsibility. There are no costs estimated for disposal easements due to the need for nourishment material along this stretch of beach. Thus the Federal Government will bear all of the costs for the proposed navigation improvements.

The requirements for local assurances for the recreational option are much the same as those for the navigation project. If the recreation option is authorized, the local sponsors, in addition to providing all

lands, easements, and rights-of-way for construction, would be required to provide a cash contribution equal to 50 percent of the final construction cost allocated to special local benefits deriving from recreation/preservation. The local sponsors would also be required to operate, maintain and replace without cost to the Federal Government, the recreation areas and all facilities installed pursuant to the agreement.

FEDERAL RESPONSIBILITIES

Under the recommended plan of improvement, the Federal Government would dredge the channels in Folly River and at Stono Inlet as described above as "The Selected Plan" and shown on Plates 1,2, and 3, provide necessary aids to navigation to adequately mark the channel and periodically redredge the more persistent shoals on an as needed basis. The material removed from the Folly River shoals would be placed on the beach fronting western Folly Island. Provided Charleston County Park, Recreation and Tourist Commission acquires the undeveloped spit on western Folly Island, and desires to proceed with development of this property into a beach/access biological observation park; the Charleston District will, in cooperation with PRT: design the necessary facilities improvements; develop plans and specifications; contract for and supervise the construction of those facilities. In addition, the Corps of Engineers will contribute one-half of the construction costs; now estimated at $175,000. The Bureau of Outdoor Recreation is expected to provide one-half the purchase price of lands. This will result in a Federal contribution through that agency of $250,000.

The Federal share of the navigational improvements is presently estimated to be $265,000 first cost and $67,000 annual maintenance cost. The Federal share of the recreational development is presently estimated to be $337,500 first cost; no Federal funds will be contributed towards operation and maintenance of this facility.

NON-FEDERAL RESPONSIBILITIES

Charleston County, the local sponsor for this project, would: (1) have to provide easements and rights-of-way necessary for the construction and proper maintenance of the project; (2) bear the costs of modifications to all utilities and highway crossings required for project construction; (3) hold and save the United States free from damages due to construction and maintenance of the project, provided damages are not due to the fault or negligence of the United States or its contractors; (4) provide, maintain, and operate without cost to the United States an adequate public landing or wharf with provisions for the sale of motor fuel, lubricants and potable water open and available to all on equal terms; (5) provide and maintain without cost to the United States depths in berthing areas and local access channels serving the terminals commensurate with depths to be provided in the related project areas; (6) take action to place in effect necessary statutes and/or regulations which will protect the water quality for the authorized uses of the project; these regulations shall be in accordance with applicable laws or regulations of Federal, State, Interstate and local authorities responsible for water quality control. In addition, if the recreation option is authorized and constructed as part of the project, the local sponsor would be required to acquire in its name and dedicate to public outdoor recreation use for the economic life of the project (50 years) all lands required for the recreational development and operate,

maintain and replace without expense to the Federal Government the recreation areas and all facilities installed pursuant to the agreement.

The presently estimated non-Federal share including the purchase and development of the beach park is $337,500. There would be no cash contribution required if the recreation option is not approved.

PLAN IMPLEMENTATION

Through the interdisciplinary planning approach, a plan of improvement has been developed which meets all of the evaluation criteria. However, before construction can begin to implement this plan, numerous additional actions must take place.

Final coordination with local, state and Federal agencies will be conducted; this will include circulation of the main report and the Environmental Assessment. In addition, review, analysis and coordination will be performed, after authorization, to insure that implementation of the selected plan will be in compliance with the relevant provisions of the following acts:

1. The River and Harbor Act of 1899 (33 U.S.C. 403).

2. Federal Water Pollution Control Act Amendments of 1972 (PL 92-500).

3. The National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347).

4. The Fish and Wildlife Act of 1956 (16 U.S.C. 472a et seq), the Migratory Marine Game - Fish Act (16 U.S.C. 760c - 760g) and the Fish and Wildlife Coordination Act (16 U.S.C. 661-666c).

5. The National Historic Preservation Act of 1966 (80 Stat. 915, 16 U.S.C. 470).

6. The Coastal Zone Management Act of 1972 (16 U.S.C. 1456 (c) (1) and (2), 86 Stat. 1280).

7. The Marine Protection, Research and Sanctuaries Act of 1972 (PL 92-532).

8. The Endangered Species Act of 1973 (PL 73-205).

Due to the extent of prior coordination with area resource managers, no objections to the plan are anticipated. Unless objections are encountered, an Environmental Impact Statement would not be prepared and a negative declaration to this effect would be placed on file.

This report will then be forwarded to the next higher authority, South Atlantic Division Headquarters in Atlanta, Georgia, for review. Here the report will be judged for soundness of decisions and compliance with Federal planning guidance and a decision will be made regarding the inclusion of the recreation option in the recommended plan. Following this, the report will be forwarded to the office of the Chief of Engineers, Washington, D. C.,

for further review. At that time, the Division Engineer, in Atlanta, may authorize the District Engineer to commence work on plans and specifications pending approval of the Chief's Office.

The Office of the Chief of Engineers would review the report; set the requirements of local cooperation including the cost sharing aspects of the recreation option; coordinate the recommended project with the legislative representatives of South Carolina; and providing the Governor endorses the project and the required local assurances can be obtained, authorize the project for construction.

Funds for post authorization studies and construction must then be requested from and allotted by the Chief of Engineers.

After funds have been allotted and preparations for construction are finalized, the local sponsor must sign a formal agreement to supply the items allocated to them. The necessary work would then be advertised for bids and a contract for construction awarded. Following construction, the recreation facilities project would be turned over to the local sponsor who would then assume responsibility for operation and maintenance of the park; the navigation project would be maintained by the Federal Government.

The time frame for completion of all these actions is difficult to predict, however, the project could be initiated during Fiscal Year 1978.

VIEWS OF NON FEDERAL INTERESTS

The study leading to this report was coordinated on a continuing basis with numerous state and local agencies;in addition, a second public meeting was held at the Folly Beach Community Center 8 February 1977 to explain the alternatives considered and solicit the opinions of interested citizens regarding the selections made in formulating the recommended plan of improvement.

The South Carolina Wildlife and Marine Resources Department believes the navigation improvements are needed and that the recommended plan can be accomplished without degrading the environment if it is properly scheduled. SCW&MRD has also endorsed beach disposal and the recreation option as a sound management measure.

Charleston County Park, Recreation and Tourist Commission, while having no comment on the navigational aspects of the plan, has requested Corps participation in the recreation option.

The South Carolina Department of Health and Environmental Control commented that since no diked disposal areas would be required, they had no objections to the project.

Attendance at the last public meeting was high; the general public concurred in the selection of the recommended plan and is desirous of early completion of the project. Some citizens of the City of Folly Beach had

reservations about the recreation option: they were apprehensive about the increased visitation to the island and the loss of tax revenues which would result from public ownership of the land in question.

REVIEW BY OTHER FEDERAL AGENCIES

The U. S. Fish and Wildlife Service has been continuously involved in the project formulation. They have commented that they believe the environmental effects of the dredging will be minor and that inclusion of the recreation/preservation option will cause the project to have a net positive effect on the local environment. Their evaluation is based on the assumption that the work will be performed during the winter when biological productivity is low.

The U. S. Environmental Protection Agency concurs with the selection of "beach nourishment" as the best disposal alternative but cautioned that the use of the sidecaster dredge at Stono Inlet would require further coordination.

The National Marine Fisheries Service has not as yet commented on this project.

Pertinent correspondence regarding the views of other agencies and interested concerns is contained in Appendix Three.

SUMMARY

The Folly River area is a modest income residential and resort area whose economic base has traditionally revolved around recreation, tourism and commercial fishing. Recent shoaling of the area's ocean access channels is threatening the viability of the local shrimping industry and preventing the possible development of other commercial enterprises (marinas, charter vessels, etc.). If economic growth of these enterprises is to continue, the shoaling problems must be alleviated. Public beach access is also a resource need.

Various solutions to the problems and needs of the community were analyzed for their contribution to navigation and their effects in other areas of concern. Based on this analysis, it is concluded that the most feasible plan for maintaining navigation at this time is to provide shallow draft navigation channels in Folly River, Folly Creek and at Stono Inlet. Accordingly, the selected plan provides for channels 9 feet deep by 80 feet wide in Folly River and Folly Creek, west of Highway 171, and a channel 11 feet deep and 100 feet wide at Stono Inlet. In addition, the selected plan provides for participation with Charleston County Park, Recreation and Tourist Commission in the development of a beach access/biological observation park on the western tip of Folly Island.

The overall environmental effect of this plan would be positive. Some benthic organisms would be destroyed and water quality would be slightly degraded: both of these effects, however, should be localized and transitory. The inclusion of the park proposal would preserve an area of great aesthetic and environmental value. Though there are some negative aspects to this measure, loss of tax base, increase in traffic, etc., these can be ameliorated and the benefits far outweigh the costs.

Based on projected increases in catch and decreased maintenance costs, the navigation project is economically justified. Total first cost for channel improvements and aids to navigation is $265,000, average annual costs would be $84,700 and average annual benefits are projected at $148,200. The benefit/cost ratio is 1.7 to 1.0.

A separate economic analysis of the recreation option indicates that it too is economically justified. Total first cost for this aspect of the plan would be $675,000; the average annual cost would be $52,200. The value of increased recreational opportunities would be $303,000. The benefit cost ratio is 5.8 to 1.0.

Social and economic benefits of the project include increased income, employment and viability of the local shrimping industry and increased recreational opportunities for area residents.

Construction would be by the United States after authorization and funding by the Chief of Engineers and after receipt of non-Federal contributions.

Corps of Engineers' cost for the improvement would be $352,500 and the Bureau of Outdoor Recreation's cost $250,000 for a total Federal cost of $602,500. The non-Federal cost would be $337,500 if the sponsor qualifies for assistance from BOR and $587,000 otherwise. It would be possible to prepare detailed plans and construct the project in less than one year, provided the necessary funds are made available.

Following construction, the Federal Government would maintain project depths in the improved channels. Non-Federal interests would maintain public access to the project, and commensurate depths at dock facilities. In addition, non-Federal interests would operate and maintain the park facility sharing revenues generated from it with the City of Folly Beach.

The navigation plan is acceptable to local interests both in the immediate planning area and throughout the county. However, opinion is divided on the recreation option: County residents are generally in favor of the beach park but many Folly Beach residents are opposed to development of a beach access park on the island.

Interested Federal agencies find the plan compatible with their review objectives.

TABLE 7

SUMMARY EFFECTS ASSESSMENT FOR SELECTED PLAN

CONSIDERATION	WITHOUT PROJECT	WITH NAVIGATION PROJECT	WITH RECREATION OPTION
SOCIAL EFFECTS			
Noise	Noise is not a significant problem in the area at present nor is it likely to become one.	Dredging equipment will make engine noise during initial and maintenance dredging but will be localized and transitory.	Recreation development will add some traffic which will increase background noise level on main access road.
Displacement of People	Individuals dependent on shrimp fishing will be forced to relocate to alternate ports.	Fishing community will not have to relocate to alternate ports.	Recreation option would have no effect on this.
Aesthetic Values	Added piecemeal development of western Folly Island will reduce aesthetic appeal of the island.	Dredging will not affect visual appearance of rivers or adjacent shores.	Recreation option will preserve in near natural state an area of high aesthetic value.
Community Cohesion	Without project, fishing community will be disrupted or destroyed.	Fishing community will continue to grow and prosper.	Recreational development if properly handled could increase understanding between shore and inland communities.
Desirable Community Growth	Members of fishing communities will migrate out of area. Influx of resort and resident population will diminish without deep water ocean access.	Stable ocean access will favorably affect community growth.	Increased public access to open space and recreational opportunities would favorably affect community growth.
ECONOMIC EFFECTS			
Tax Revenues	Continued erosion of front beach and shoaling of ocean access, increased crowding and lack of open space will diminish land values and consequently tax base.	Dependable ocean access will increase land values and consequently tax base.	Recreation option will reduce tax base by $2500 but increase value of neighboring property. Tax loss can be ameliorated through sharing of revenues derived from user parking fee.
Property Values	Scarcity of shore property should cause values to increase but erosion may alter this.	Continued ocean access should contribute to increased property values.	Management of beach access and preservation of open spaces should increase property values.
Public Facilities	Water, sewer and solid waste systems inadequate; assistance uncertain. Future development potential limited by above.	Navigation project will have no effect.	Demands on water, sewer & solid waste systems would increase. Public use of end of island could favorably affect government assistance in future development.

TABLE 7 (Cont'd)

SUMMARY EFFECTS ASSESSMENT FOR SELECTED PLAN

CONSIDERATION	WITHOUT PROJECT	WITH NAVIGATION PROJECT	WITH RECREATION OPTION
ECONOMIC EFFECTS (Cont'd)			
Public Services	Littering on beaches and accessways is causing solid waste collection problems; city cannot afford proper policing of the beach.	Navigation project will not affect demand for public services except increas i safety may reduce demand for rescue services.	Increased visitation will increase demands for services. However, PRT Management Plan may take up some of the existing pressure and thereby reduce pressure on Folly Beach.
Regional Growth	Desirable regional growth will continue to be stagnant; loss of fishing community may cause negative growth.	Fishing community would remain and grow.	Increased open space will add to attractiveness of the area; may increase desirable regional growth.
EMPLOYMENT/LABOR FORCE	Employment in fisheries and related activities will decrease.	Employment in fisheries and related activities will be sustained and may increase.	Increase in visitation to community would increase employment in services and retail trade.
BUSINESS ACTIVITY	Reduced navigability will negatively affect commercial fishing business and will gave ripple effects in related activities. Rentals and retail trade would also be hurt.	Negative effects of loss of fishery would be avoided. Real estate business would be helped.	Increased visitation to island should increase business opportunities.
	No farms would be affected.	No effect.	No effect.

TABLE 7 (Cont'd)

SUMMARY EFFECTS ASSESSMENT FOR SELECTED PLAN

CONSIDERATION	WITHOUT PROJECT	WITH NAVIGATION PROJECT	WITH RECREATION OPTION
ENVIRONMENTAL EFFECTS			
Man-made Resources	Utility of docks and other shoreside facilities would be reduced; vessels would continue to be damaged.	Vessel dmages should be reduced. Shoreside facilities will be of continued use.	Structures will not be built in an area where they would be destroyed by hurricane storm surges.
Natural Resources	Navigability of ocean access will be limited; harvesting of marine resources hindered.	Navigability of ocean access channels will be maintained. Harvesting of marine resources would increase. Some temporary degradation of water quality would be experienced and some benthic organisms lost.	Access to beach would be increased, aesthetically and environmentally important dune and bayshore area would be preserved.
Air Quality	Not presently a problem.	Navigation project will not affect air quality.	Increased traffic will slightly increase auto emissions.
Water Quality	Coliform count in estuary some times high; municipal sewage collection and treatment needed.	Water quality will be temporarily degraded in area around and down current of dredge.	On site treatment will eliminate possibility of water quality degradation.

STATEMENT OF FINDINGS

I have reviewed and evaluated, in the light of the overall public interest, the documents concerning the need for and feasibility of providing a shallow draft navigation channel at Folly River to accomodate the navigational needs of the shrimping fleet based there. In addition, I have solicited the views of other interested agencies and the concerned public as to how the needs of the local fishermen and the citizenry at large could best be met. Members of an interdisciplinary planning team representing many pertinent disciplines have studied the possible consequences of several alternative plans to determine the effects each plan would have on the economy, the environment and the social well being of the population (an abridged display of these are shown in the preceding table). From this information, a plan of improvement has been developed which will adequately serve navigation, while at the same time enhancing the natural and human environment of the area. The proposed project will provide for the safe navigation of all vessels expected to use this waterway, and will increase the recreational opportunities available to area residents.

In evaluation of the selected and other viable alternatives, the following points were considered pertinent:

a. Due to natural shoaling, Folly River and Stono Inlet are becoming unusable by the commercial fishing vessels harbored there. If

this trend continues unabated, an important part of the economic base of the immediate area will be destroyed and the lives of many citizens disrupted.

b. A plan to alleviate this situation has been developed which is economically justified, environmentally compatible and socially acceptable. Responsible officials concerned with the natural resources of the area have indicated that the plan would not be disruptive of the environment and the public has participated in the formulation of the plan.

c. The private sector does not possess the resources necessary to accomplish the task, and the maintenance of the navigable waters of the United States is a mandated responsibility of the Army Corps of Engineers.

I find that the action proposed, as developed in the preceding section, "The Selected Plan", is based on a thorough analysis and evaluation of various practicable alternative courses of action for achieving the stated objectives. The selected plan satisfies all the previously stated evaluation criteria; is consonant with national policy, statutes and administrative directives and the general public interest would best be served by implementation of the selected plan.

RECOMMENDATIONS

It is recommended that a Federal project, to provide shallow draft channels at Folly River, Folly Creek and Stono Inlet and recreational facilities at Folly Island, as described in this report as "The Recommended Plan" with such modifications as in the discretion of the Chief of Engineers are deemed advisable, be approved under the authority of Section 107 of the River and Harbor Act of 1960, as amended. Construction of the project is recommended provided local interests agree to the following:

a. Provide without cost to the United States all lands, easements and rights-of-way necessary for the construction and subsequent maintenance of the navigation features of the project and for aids to navigation upon request of the Chief of Engineers, including suitable areas determined by the Chief of Engineers to be required in the general public interest for initial and subsequent disposal of dredged material and including necessary retaining dikes, bulkheads, and embankments therefore, or the cost of such retaining works all at a presently estimated cost of $Zero.

b. Hold and save the United States free from damages due to the construction and maintenance of the project, provided the damages are not due to the fault or negligence of the United States or its contractors;

c. Accomplish without cost to the United States all alterations and relocations of buildings, transportation facilities (excluding railroad, combined highway and railroad, and publicly owned highway bridges and approaches thereto) storm drains, utilities, and other structures and improvements made necessary by the construction at a presently estimated cost of $Zero.

d. Provide, maintain and operate without cost to the United States an adequate public landing or wharf with provisions for the sale of motor fuel, lubricants and potable water open and available to the use of all on equal terms.

e. Provide and maintain without cost to the United States depths in berthing areas and local access channels serving the terminals commensurate with depths to be provided in related project areas;

f. Take action to place in effect necessary statutes and/or regulations which will protect water quality for the authorized uses of the project. These regulations shall be in accordance with applicable laws or regulations of Federal, State, Interstate and local authorities responsible for water quality control.

g. Acquire, in its name and dedicate to public outdoor recreation use for the economic life of the project, all lands required for the recreational development and operate, maintain and replace without cost to the United States the recreation areas and all facilities installed pursuant to the agreement;

h. Adopt appropriate ordinances or provide other means to insure preservation of the beach fill areas and dunes;

i. In accordance with the Federal Water Project Recreation Act, Public Law 89-72, provide a cash contribution equal to 50 percent of the final first cost allocated to special local benefits deriving from recreation, which contribution is presently estimated at $87,500.

for William C. Mattei

WILLIAM W. BROWN
Colonel, Corps of Engineers
District Engineer

WILLIAM C. MATTEI
Major, Corps of Engineers
Deputy District Engineer

END